

# A Description of the Arc and Spark Spectra of Rhenium

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For purposes of chemical identification and of structural analysis, a more complete and accurate description of the atomic emission spectra of rhenium was required. Such a description was obtained by using solid metal electrodes of rhenium in conventional arcs or sparks, photographing the spectra with the aid of large spectrographs containing concave gratings, and measuring the wavelengths of spectral lines relative to secondary standards in the spectrum of iron. Relative intensities were carefully estimated for all lines, and the total widths of many broad lines were measured. Results are presented for approximately 6,000 lines ranging in wavelength from 2000.47 Å in the ultraviolet to 11788.9 Å in the infrared. A comparison of the estimated intensities in arc and spark spectrograms provides a separation of the spectral lines arising from neutral rhenium atoms from those originating in ionized atoms. In this description the Re I spectrum is represented by about 4,200 lines and the Re II spectrum by nearly 1,800 lines.

## 1. Introduction

Rhenium is the last stable element to be discovered in the earth's crust. Since its discovery in 1925, rhenium has been found to possess many remarkable properties. For example, its high melting point (3,170° C) is exceeded only by those of carbon and tungsten; its density (20.5) is next to those of osmium, iridium, and platinum. The metal is very hard and can be rolled or drawn only at red heat. Combined with various other metals rhenium forms alloys that are extremely resistant to acids and stable at high temperatures in air. Alloyed with platinum or rhodium and paired with pure platinum, rhodium or palladium, thermocouples are formed that give four times greater thermoelectric forces than the common couples of noble metals, and are stable and useful to nearly 1,900° C. In high vacuum, even at high temperatures, rhenium shows no inclination to sputter and is therefore ideal for filaments of incandescent lamps and vacuum tubes. By depositing rhenium upon metals or glass, optical mirrors of high permanence and reflectance are produced.

The terrestrial abundance of rhenium (0.001 g/ton) is about the same as that of rhodium or iridium, and the current price (\$2.00/g) is less than that of platinum and only a third that of iridium. The total annual production of rhenium metal is now only some hundreds of pounds, but its remarkable properties insure increased concentration and extensive future application in science and industry. When this wonder metal becomes common in metallurgy, it will be desirable to have for spectrochemical determination, a satisfactory description of its optical spectra. Furthermore, the spectra of rhenium atoms and ions exhibit some unusual features that lead to interesting information concerning atomic structure, electronic binding forces, and properties of atomic nuclei. To supply descriptions of the arc and spark spectra of rhenium that will be adequate for spectrochemical analysis and for structural analyses of the first two spectra is the purpose of the present paper.

The principal proof of discovery of rhenium by Noddack, Tacke, and Berg [1]<sup>1</sup> was the observation of five Röntgen radiations with wavelengths ranging from 1.216 to 1.430 Å. The first reference to the optical spectra of rhenium was made in 1928 by Noddack [2], who reported "we know at present several hundred lines which certainly belong to rhenium . . . . The optical last lines of rhenium, especially the triplet at 3640 Å permit its identification in concentrations down to 10<sup>-7</sup>". This first numerical value contains two transposed figures; it should read 3460 Å.

In 1931, preliminary data for the arc spectrum of rhenium were published by Meidinger [3], by Schober and Birke [4], and by Meggers [5]. Meidinger [3] observed the spectrum of rhenium powder in a d-c arc between carbon electrodes. The interval between 2600 and 3500 Å was photographed with a quartz prism spectrograph and the interval 4040 to 5300 Å with a glass prism spectrograph, the reciprocal dispersions for the longer waves being 25 and 30 Å/mm, respectively. The wavelengths of 229 lines were given to five figures "for spectrochemical purposes", and intensities of weak, medium, or strong were assigned to the lines.

Schober and Birke [4] reported the wavelengths (3108.94 to 6441.28 Å) of 31 strong lines of rhenium on the Rowland scale and stated that 3452.02 (5), 3460.61 (5), and 3464.87 (5) were the last lines to disappear when salt solutions of rhenium were diluted. Schober [6] then published a description of "the arc spectrum of rhenium in the photographic range", giving wavelengths (2391.60 to 6494.15 Å) of about 400 lines, and estimated relative intensities (1 to 100). These data were obtained from concave grating spectrograms with reciprocal dispersion of 4 Å/mm, the source being a carbon arc with rhenium solution added to the anode. This work was repeated with copper instead of carbon electrodes and reported in three papers [7], which give for more than 2,000 rhenium lines wavelengths ranging from 2405.14 to 7641.20 Å, intensities from 1 to 1000, and line

<sup>1</sup> Numbers in brackets refer to literature references at the end of this paper.

widths from 0.1 to 1.0 Å. In the region of short waves Schober's lists are a mixture of Re I and Re II spectra without any means of distinguishing them.

A preliminary report on the optical spectra of rhenium by Meggers [5] announced observations of arc and spark spectra, hyperfine structure, and the first atomic energy levels and spectral terms for Re I. More details were given in a paper on the arc spectrum of rhenium [8], which presented 2,200 wavelengths (2500.59 to 8797.6 Å), 115 atomic energy levels, and approximately 500 classified lines. Because the data on rhenium spark spectra were less complete, they were withheld. That list of rhenium arc lines, obtained with crystals of pure potassium perchlorate on silver electrodes in a d-c arc, was extended [9] to longer waves (10639.44 Å) in 1933, when new infrared sensitive emulsions became available.

A statement in 1931 by Schober [10] that among 60 strong rhenium lines, 24, including the 3 strong ultraviolet lines and 2 green ones, coincide with the Fraunhofer spectrum was contradicted by Moore and Meggers [11], who found that the accordance of solar and laboratory wavelengths of strong rhenium lines does not appear to be exact or real when the hyperfine components of these lines are taken into account. These hyperfine-structure measurements were the first to be reported for rhenium. Almost identical measurements for 3 rhenium lines were independently made by King [12], who observed 19 low-level lines of Re I in a carbon-tube furnace containing metallic rhenium at a temperature near 2,800° C. The striking hyperfine structure of certain rhenium spectral lines was investigated and interpreted by Meggers, King, and Bacher [13], by Gremmer and Ritschl [14], by Sommer and Karlson [15], by Zeeman, Gisolf, and deBruin [16], and finally by Schüler and Korsching [17]; all agreed that the two isotopes of rhenium, with masses 185 and 187, possess nuclear moments of  $5/2$  ( $h/2\pi$ ). The last [17] also measured the magnetic moments, electric-quadrupole moment, and isotope shifts characteristic of rhenium isotopes.

Additional measurements of wavelengths in arc and spark spectra of rhenium appear in the MIT Wavelength Tables [18] where data for 2256 lines are given, partly new and the rest quoted from other published tables. Employing the MIT data, Klinkenberg [19] extended the analysis of the Re I spectrum to include approximately 1600 lines as combinations of 221 atomic energy levels. An extension of the Re I analysis was independently made by Velasco [20], but further progress in this direction is greatly handicapped by the inadequacy of the published data for rhenium spectra. The paucity and poor quality of published data for spark lines have frustrated earlier attempts to establish and analyze Re II spectrum of singly ionized rhenium atoms. Except for the paper by Zeeman, Gisolf and deBruin [16], which describes the partially resolved Zeeman patterns of three Re I lines (3452, 3460, 3464 Å), no further details of the Zeeman Effect in rhenium have been published. All these deficiencies have recently

been removed, and a preliminary announcement of rhenium magnetic splitting factors and of the structure of the Re II spectrum has been made by Meggers, Catalán, and Velasco [21].

In concluding this review of contributions to information regarding the spectra of rhenium, attention is called to the beautiful photographic charts of arc and spark spectra of rhenium prepared by Gatterer [22]. Six 40 cm prints show prismatic spectra of the rhenium arc from 2156.71 to 6250.75 Å, and six similar prints reproduce the prismatic spectra of the rhenium spark from 2091.50 to 6250.75 Å. A table accompanying this Atlas gives the wavelengths of 232 of the stronger arc and spark lines of rhenium, with intensities ranging from 1 to 10.

All previous observations of rhenium spectra were made with electric arcs or sparks between either carbon, silver, or copper electrodes to which samples of rhenium were added either in the form of solutions, salts, or metal powder. Under these conditions it is practically impossible to produce complete descriptions of the spectra because bands due to carbon compounds or lines characteristic of silver or copper will mask a certain number of rhenium lines and falsify the wavelengths and intensities of others blended with electrode lines. The present observations of rhenium spectra are justified by the following facts: They were made mainly with solid metallic electrodes of pure rhenium, thus avoiding confusion on account of coincidence with other spectral lines; they were extended to shorter and to longer waves by using new types of photographic emulsions; they were made with generally higher spectrographic dispersion and resolving power than the first observations; and they are based on juxtaposed arc and spark spectra that provide the first useful identifications of Re I and Re II spectra. In short, the present observations have more than doubled the previous number of real rhenium lines and have provided homogenous material of increased accuracy in wavelengths and relative intensities to meet the future needs of spectrochemistry and the search for atomic energy levels as derived from analyses of optical spectra.

## 2. Experimental Details

Most of the new data for rhenium spectra presented in this paper were obtained from arcs or sparks between electrodes of commercial rhenium metal. The electrodes were made by pressing rhenium metal powder in a Dietert hydraulic press developed especially for compacting metal powders, filings, borings, turnings, etc. into cylindrical rods for spectroscopic electrodes. The cylindrical electrodes were approximately 6 mm in diameter and 10 mm long. These solid cylinders of rhenium were pinched in slotted copper or brass rods, which served as arc or spark electrode holders.

The arc spectra were excited in a d-c arc with an applied potential of 220 v and a current of 6 to 10 amp. The spark spectra were obtained with a high-voltage condensed discharge from mica condensers of 0.006- $\mu$ f capacity connected to the secondary coil of

a transformer rated at 30,000 v when the primary was connected to the 120-v a-c power line.

All the spectrograms were made with concave diffraction gratings of about 22 ft radius of curvature, mounted to perform stigmatically as described by Meggers and Burns [23]. Three mountings of this Wadsworth type were available, containing respectively 6 in. gratings with 30,000, 15,000, or 7,500 lines/in. The first is used primarily to photograph spectra in the ultraviolet and visible, the second mainly for visible and near infrared, and the third for infrared spectra only. Further information concerning these spectrographs and the photographic plates used with each is given in table 1.

TABLE 1. Data on spectrographs and photographic plates for recording Re spectra

Spectral region	Grating	Spectral order	Reciprocal dispersion	Photographic plate
<i>A</i>	<i>Lines/inch</i>		<i>A/mm</i>	
2000 to 2550	30,000	I	2.4	Eastman SWR
2500 to 3500	30,000	II	1.1	Eastman 33
3500 to 4500	30,000	II	0.9	Eastman 33
4400 to 6800	30,000	I	2.2	Eastman II F
6600 to 8800	30,000	I	1.8	Eastman I N
7200 to 9000	20,000	I	3.7	Eastman I R, I P
8600 to 11000	15,000	I	4.8	Eastman I Q
10000 to 12500	7,500	I	10.2	Eastman I Z

In the 1933 observation [9] of the infrared arc spectrum of Re, Eastman plates I R and I P were used with a Rowland grating having 20,000 lines/in., and "Xenocyanine" plates were used with the Anderson grating, 7,500 lines/in. These combinations, it was found, were hard to surpass, and although these spectral ranges were reobserved with other plates and gratings, very little was added to the existing data in those ranges. However, some additional lines of longer wavelength were recorded on I Z plates, which were not available in 1933. The Q and Z plates were hypersensitized immediately before use by bathing them in a 2- to 5-percent solution of ammonia in water. They were then rinsed in alcohol and dried with moving warm air.

The durations of exposure required for recording arc or spark spectra under different conditions were determined by estimation and trial, so that the background continuum imposed the limit. The exposure times for the Re arc ranged from a few seconds in the ultraviolet to 5 hr in the infrared. Likewise, the spark spectra were recorded in times ranging from a few minutes to 2 hr. Between the limits 2000 and 6800 Å, the arc and spark spectra of Re were photographed either side by side with iron comparison spectra flanking each or the arc and spark spectra were recorded respectively above and below a center strip showing the iron spectrum with its standard wavelengths.

An effort was made to match the arc and spark spectra, especially in the ultraviolet, so that most of the lines appearing in the arc spectrogram were recorded with almost equal intensity in the spark spectrogram. Under these conditions all lines appearing only, or with greater intensity, in the spark spectrograms may safely be assumed to originate in

ionized rhenium atoms, whereas the others belong to neutral atoms. Although some spark lines are enhanced more than others, the stronger ones are generally found also on the arc spectrograms, and there is no good reason to believe that any rhenium lines reported here belong to doubly ionized rhenium atoms.

Because the spark spectra above about 6000 Å contained no new or enhanced lines relative to the arc spectra, spark excitation was omitted for waves longer than 6500 Å. In photographing the red and infrared spectrum (6500 to 12000 Å) the arc was imaged on the spectrograph slits through deep-red glass filters, which transmit only waves longer than 6500 Å, and one or two narrow strips of the iron arc spectrum were superimposed to furnish standard wavelengths. These standards were always taken from the same spectral order as the rhenium waves to be measured, except beyond 8800 Å to 12000 Å, where iron standards were taken from the second or third spectral orders and multiplied respectively by two or three.

The rhenium spectrograms were measured with a large comparator made by the Gaertner Scientific Corporation. The screw has a length of 50 cm and the scales permit direct reading of linear distances to 1 μ. Every rhenium spectral line retained in the final list was observed and measured at least twice, and many of them were measured on four or five spectrograms. In all, approximately 20,000 readings of linear distances between images of rhenium and of standard iron lines were recorded and each observation of a rhenium line was accompanied by an estimated intensity. The final values of rhenium wavelengths and relative intensities are averages of the individual observations. When the average deviation of individual values of wavelength from their mean is 0.005 Å or less, the final value is given to three decimals, and if the average deviation is greater than 0.005 Å, the final value is rounded off to the nearest second decimal.

In reviewing the earlier work on rhenium spectra, reference was made to the hyperfine complexity of some of its lines. When these spectra are observed with high dispersion and resolving power, it is at once obvious that a majority of Re I and Re II lines are more or less wide and complex. Even with the average gratings used in this investigation several dozen rhenium lines were completely resolved, usually into six components, and many hundreds of lines were either partially resolved or shaded to indicate intensity degradation either to shorter (*s*) or to longer (*l*) waves. In most cases, the observed wavelengths of rhenium represent values obtained by bisecting their slit images, except that when the complex line appeared to be more than 0.1 Å wide the edges were measured and thus both width and mean wavelength were recorded. In the observed infrared some rhenium lines have widths exceeding 2 angstroms, or 2 wave numbers. The details of rhenium hyperfine structure are omitted here because they are not accurate enough for nuclear physics and are not of vital importance either in industrial



spectrochemistry or in structural analysis of these spectra.

It may be remarked, however, that because of the relatively coarse hyperfine structure in the strongest spectral lines of rhenium, the sensitivity of spectral detection is low compared with that of otherwise comparable metals having narrower lines. A complication for spectrum analysis arises from the fact that many rhenium lines appear to have hyperfine structures deviating from the usual "flag pattern" of regular decrement of spacing and intensity. It is often difficult to decide if close pairs or irregular groups of rhenium lines are in fact separate lines or components of complex lines. Some of these doubts may be resolved in establishing further atomic energy levels of rhenium from analyses of optical spectra without regard to hyperfine structure.

The conspicuous hyperfine structures in rhenium spectra not only complicate the determination of wavelengths but also affect the estimation of relative intensities of the lines. Usually such estimated relative intensities depend on the widths as well as the densities of the photographic images, and when the widths are greatly increased by hyperfine structure, there is a tendency to overestimate intensities. In the present work a conscious effort was made to discount the contribution of hyperfine width to intensity, but it may not be entirely eliminated.

A final difficulty in describing the arc and spark spectra of rhenium arises from a strong background that is continuous throughout the spectrum on fully exposed spectrograms, and in the visible and infrared regions has superimposed on it the coarse rotation structure of molecular spectra, presumably of rhenium oxide. This background imposes a limit on the detection of faint lines, and the molecular lines are often blended with the atomic lines. The molecular lines were not intentionally measured, but band heads were included when they were obvious or unmistakable; these are marked *B* in the list of lines.

### 3. Results

The results of this investigation are presented in table 2, where the measured wavelengths (in angstroms) of rhenium spectral lines (column 1) are followed by estimated relative intensities in arc and spark spectra. The intensity numbers range from 1 to 10000; they are accompanied in many cases by letters and other numbers. The letters accompanying intensities impart additional information concerning the lines; they have the meaning adopted by the International Astronomical Union [24] in a proposed notation for the description of spectral lines as follows: *B*, band head; *c*, complex (narrow fine structure, isotopic or nuclear-spin hyperfine structure); *d*, unresolved double (approximate coincidence of two lines); *h*, hazy, diffuse, nebulous; *H*, very hazy, diffuse, nebulous; *l*, shaded or displaced to longer waves; *s*, shaded or displaced to shorter waves; *r*, narrow self-reversal; *R*, wide self-reversal; *w*, wide; *W*, very wide.

Table 2 represents a careful selection of data from

the much more extensive observational material that included spectral lines due to impurities, components of resolved hyperfine structure, lines doubtfully belonging to molecular spectra, lines observed only once, and lines arising from overlapping spectral orders.

Because the rhenium metal used in this investigation was extremely pure, the identification and removal of spectral lines due to impurities was not difficult; the total number of such lines was about 30. Only the stronger lines of common contaminants appeared, as follows: B (2497.72 Å), Si (2506.89 Å), Ca (3933.66, 3968.47 Å), Mg (2795.53, 2802.70, 2852.12 Å), Al (3944.03, 3961.53 Å), Cu (3247.74, 3273.96 Å), Ag (3280.68, 3382.89 Å), Pb (3683.47, 4057.81, 10290.6, 10499.1 Å), Cr (4254.34, 4274.80, 4289.72 Å), and Na (5889.95, 5895.92, 8183.29, 8194.82, 11403.9 Å). In the visible spectrum a few lines of Cu (5105.54, 5153.22, 5782.13 Å) and Zn (4680.15, 4722.17, 4810.53 Å) were observed, but these are believed to arise from accidental flashes of the arc to the brass holders of rhenium electrodes rather than from the rhenium. The only other impurity deserving mention is potassium (7664.91, 7698.98, 11690.3, 11769.6, 11772.9 Å), which indicates that the rhenium metal was probably prepared from potassium perchlorate. The presence of the above-mentioned impurity lines provided a reliable check on the scale of wavelengths for the rhenium lines. In nearly every case the measured wavelength of the impurity line agreed with its accepted value [18] within  $\pm 0.01$  Å.

As stated before, the hyperfine structure of several dozen rhenium lines was resolved into two to six components, but the wavelengths of the individual components are omitted from table 2, where only the mean wavelength and over-all width of flag patterns is shown. There is some evidence of irregular hyperfine structures and mutilated multiplets in rhenium spectra, and such cases as appear in table 2 may be revealed in future analyses of these spectra.

Several hundred lines of low intensity were measured but not included in table 2 because some were recorded only once, and the remainder, mainly in the visible and infrared, were suspected of belonging to molecular compounds. A few lines published in earlier papers were not confirmed as atomic rhenium lines, and most of those now appear to be parts of molecular bands.

Despite the abandonment of many hundreds of lines observed in the arc and spark spectra of rhenium, table 2 contains more than twice as many lines as have heretofore been published. It should meet all present requirements for spectrochemistry and structural analysis of Re I and Re II spectra between the wavelength limits 2000 and 12000 Å.

### 4. References

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TABLE 2. Arc and spark spectra of rhenium

MEANING OF LETTERS

*B*=band head, *c*=complex (narrow fine structure, isotopic or nuclear-spin hyperfine structure),  
*d*=unresolved double, *h*=hazy, diffuse, nebulous, *H*=very hazy, diffuse, nebulous,  
*l*=shaded or displaced to longer waves, *s*=shaded or displaced to shorter waves,  
*r*=narrow self-reversal, *P*=wide self-reversal, *w*=wide, *W*=very wide.

INTERPRETATION OF MIXED LETTERS AND NUMBERS

*c*.18*W*=complex, 0.18 A range of wavelength, very wide.  
*c*.15*W**s*=complex, 0.15 A range of wavelength, very wide, shaded to shorter waves.  
*c*3, .21*W**l*=complex, 3 components, 0.21 A range of wavelengths, very wide, shaded to longer waves.  
*c*6, .222*W**l*=complex, 6 components, 0.222 A range of wavelengths, very wide, shaded to longer waves.  
*c*6, 1.25*W**l*=complex, 6 components, 1.25 A range of wavelengths, very wide, shaded to longer waves.

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2000.47	-----	6	2017.08	-----	6	2032.02	-----	30
2001.02	-----	5	2017.56	-----	5 <i>c</i>	2032.29	-----	5
2001.16	-----	30	2017.866	200 <i>P</i>	10 <i>cw</i>	2032.59	-----	20
2001.47	2	2	2017.98	-----	30 <i>cw</i>	2032.944	10 <i>c</i>	1 <i>c</i>
2002.32	-----	3	2018.54	1	40	2033.355	1	7
2002.62	-----	4	2018.95	-----	2	2033.78	20 <i>r</i>	15 <i>c</i>
2003.532	50 <i>R</i>	30 <i>c</i>	2019.28	2 <i>H</i>	30 <i>c</i>	2034.020	-----	20
2003.665	-----	30 <i>c</i>	2019.63	4	1	2034.44	-----	3
2004.14	-----	6	2019.82	-----	2	2034.824	-----	2
2004.39	2	1	2019.97	-----	10	2035.00	6 <i>c</i>	5 <i>h</i>
2004.68	2	200	2020.12	9 <i>c</i>	1 <i>c</i>	2035.49	3	-----
2005.40	-----	4	2020.34	-----	4 <i>c</i>	2035.51	-----	10
2006.00	-----	10	2020.475	-----	10 <i>c</i>	2035.96	10 <i>ch</i>	-----
2006.28	-----	15	2020.82	-----	3	2036.20	3	15
2006.53	-----	15	2021.07	2	1	2036.885	-----	3
2006.87	-----	7	2021.31	-----	10 <i>c</i>	2037.14	5	20
2007.06	8 <i>c</i>	-----	2022.54	-----	6	2037.86	-----	30
2007.12	-----	10 <i>c</i>	2022.74	-----	3	2037.96	4	15
2007.88	-----	8	2022.88	-----	2	2038.23	-----	20
2008.06	20 <i>r</i>	15 <i>c</i>	2023.07	-----	5	2038.99	30 <i>r</i>	20 <i>c</i>
2008.67	-----	2	2023.11	5 <i>c</i>	-----	2039.204	50 <i>r</i>	30 <i>c</i>
2009.19	-----	5	2023.644	2	2 <i>c</i> 0	2039.57	-----	60 <i>c</i>
2009.92	2	100	2023.787	2	-----	2039.88	3	70
2010.32	-----	20 <i>c</i>	2024.05	-----	4	2040.36	-----	15
2010.66	-----	5	2025.43	4 <i>c</i>	-----	2040.64	-----	2
2010.98	-----	10	2025.51	-----	30 <i>c</i>	2040.81	3	10
2011.09	-----	20	2026.23	4	1	2041.00	7 <i>h</i>	1 <i>h</i>
2011.82	-----	10	2026.40	-----	10	2041.27	-----	15
2012.01	2	2	2026.86	-----	6 <i>c</i>	2041.82	-----	2
2012.44	-----	4	2027.29	-----	10	2042.346	1	-----
2012.74	2	2	2027.41	6	-----	2042.470	3	-----
2013.02	-----	4	2027.45	-----	3	2042.64	2	40
2013.13	-----	2	2027.69	-----	9	2043.06	-----	3 <i>h</i>
2013.47	3	1	2027.93	6	3	2044.36	-----	4 <i>h</i>
2013.65	5 <i>cw</i>	2 <i>c</i>	2028.27	2	2	2044.825	-----	4
2013.88	-----	4	2029.375	-----	3	2044.903	2	-----
2014.66	7 <i>c</i>	2 <i>c</i>	2029.70	5 <i>cw</i>	-----	2045.75	10	5
2015.02	-----	2	2029.84	-----	7 <i>d</i>	2046.244	5	-----
2015.43	1	50	2030.26	4	2	2046.318	-----	6 <i>h</i>
2015.49	2	-----	2030.495	-----	20	2046.774	-----	10
2015.61	-----	10	2030.68	-----	2	2046.922	4 <i>h</i>	2
2015.91	-----	9	2030.903	40 <i>r</i>	10 <i>cw</i>	2047.67	-----	7
2016.17	3 <i>c</i>	2 <i>h</i>	2031.521	-----	20	2047.857	2	-----
2016.56	20 <i>r</i>	3 <i>c</i>	2031.655	4	-----	2047.955	-----	6
2016.59	-----	10 <i>c</i>	2031.96	8 <i>cl</i>	-----	2048.170	-----	5

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2048.380	-----	3	2077.280	50r	20c	2104.422	-----	10
2048.754	4	-----	2077.78	-----	20	2104.59	3	-----
2049.079	400R	200c	2077.92	8h	1h	2105.573	1	30
2050.120	-----	5	2078.21	-----	7	2106.062	-----	15c
2050.458	-----	6	2078.33	-----	7	2106.13	4	-----
2050.64	-----	15	2078.65	5h	1h	2106.51	3c	60
2050.73	-----	10	2079.05	-----	-----	2106.90	10c	4c
2051.34	-----	3	2079.33	-----	8	2107.452	60r	10cw
2052.32	10	10c	2079.92	-----	20	2108.447	10	5
2052.546	-----	10	2081.26	1	40	2108.83	-----	3
2052.772	-----	2	2081.35	7	-----	2109.22	100R	30cw
2053.10	-----	10	2081.98	-----	60	2109.46	-----	3
2053.597	1	50	2082.234	5c	100c	2109.65	-----	2
2053.730	3	-----	2083.342	4	20	2109.86	3	-----
2054.98	-----	9	2083.67	4	80	2109.953	-----	40
2055.25	2	20	2083.925	40r	8c	2110.24	20H	5h
2056.01	2	2	2084.11	15c	5c	2110.868	3	2
2056.29	15c	7c	2084.53	15	5	2111.854	10	60
2056.59	-----	15c	2085.14	-----	40c	2112.245	4	150
2056.70	2	-----	2085.594	200R	30c	2113.03	-----	4
2057.11	3	-----	2085.76	7	80	2113.87	30r	10c
2057.43	-----	6	2086.25	30H	10H	2114.25	10	100
2057.743	20c	10	2086.96	20H	5H	2115.51	1c	20c
2058.10	-----	5	2087.16	4	1	2115.76	5	-----
2058.33	-----	2	2087.30	-----	10	2116.13	10	-----
2058.520	1	15	2087.67	5	30c	2116.23	-----	7
2058.92	-----	7	2087.855	8	3	2117.64	-----	10
2059.33	-----	5	2088.23	3h	-----	2118.54	-----	5
2059.75	2	80	2088.40	-----	4	2118.671	1	15
2060.16	3c	4c	2088.56	-----	8c	2119.015	-----	2
2060.392	-----	3	2088.61	3c	-----	2119.52	4	-----
2060.55	8	5	2089.15	-----	7	2119.67	-----	1
2060.76	-----	9cl	2089.68	-----	3	2121.15	4	-----
2061.042	4	3	2090.20	3	60c	2121.27	-----	10
2061.19	3	2h	2090.34	7	3	2122.081	2	20
2062.02	-----	10c	2091.48	3	-----	2122.24	3	-----
2062.26	2	-----	2091.535	-----	30	2123.213	-----	5
2062.46	-----	40c	2091.725	7	-----	2123.84	-----	2c
2062.74	3H	-----	2091.920	-----	7	2123.89	5	-----
2062.86	-----	3	2092.24	50r	10c	2124.445	-----	9
2063.13	-----	5	2092.41	5	100cw	2125.183	-----	9
2063.792	40cws	10cw	2092.50	2	50c	2125.576	-----	3
2064.16	-----	20	2092.835	15c	2c	2126.42	5c	-----
2064.762	30	5	2092.96	-----	5c	2126.73	3	4
2064.87	-----	30	2093.431	-----	7c	2126.85	4	5
2065.17	-----	20	2093.792	-----	15	2126.96	-----	3
2065.64	-----	3	2094.00	-----	2	2127.28	-----	2
2065.83	-----	15	2094.50	5	1	2127.85	2c	-----
2066.53	-----	8	2094.622	8	2	2128.09	-----	3c
2066.89	20	-----	2094.90	-----	10c	2128.392	-----	8
2066.91	-----	30c	2095.26	5	3	2128.53	-----	4
2067.64	10	40c	2095.33	2	-----	2128.773	4c	6
2067.89	20r	8c	2095.52	4	-----	2129.40	-----	1
2069.15	-----	3	2095.57	-----	6c	2129.579	2	10
2069.42	6	60c	2096.22	-----	3	2129.91	-----	1
2069.86	-----	9	2097.122	100R	20	2130.16	2c	-----
2070.13	-----	5	2097.603	4	6	2130.513	4c	10
2070.42	-----	6	2097.703	4	-----	2131.01	2	-----
2070.82	3	-----	2097.77	-----	10	2131.265	-----	2
2071.11	3	-----	2098.41	4	2	2131.44	2	2h
2071.175	-----	10	2098.53	-----	3	2131.59	2	-----
2071.423	-----	20	2098.62	7cl	2	2132.53	4c	-----
2071.65	3	-----	2099.28	-----	10	2133.122	2	9
2072.09	-----	20	2099.59	-----	3c	2133.41	5	2
2072.19	6	1	2099.85	-----	7	2133.776	-----	20
2072.59	5	-----	2100.10	3	3	2134.34	4	-----
2072.62	-----	30	2100.58	-----	7	2134.594	-----	6
2072.88	-----	15c	2100.63	5	-----	2134.773	-----	10c
2073.273	20c	10c	2100.753	5	-----	2135.07	5	2
2073.898	10	6	2100.85	-----	8	2136.10	3	-----
2073.97	3	1	2101.12	2	3	2136.22	-----	5
2074.70	20r	15	2101.51	-----	8	2136.36	2c	-----
2074.82	5	2	2101.72	10c	5c	2136.701	-----	4
2075.11	-----	20	2102.28	-----	4	2137.07	-----	2
2075.20	5	2	2102.67	3	-----	2137.50	20Hw	10Hw
2075.65	10c	-----	2102.99	-----	6c	2138.10	4H	1h
2075.70	-----	50c	2103.29	-----	4c	2138.44	5h	2h
2076.30	-----	20c	2103.575	1c	40c	2138.56	-----	4
2076.55	-----	9c	2103.864	-----	6	2138.63	4	-----
2077.08	-----	4	2104.102	10c	6	2139.04	3	100

TABLE 2. Arc and spark spectra of rhenium—Continued

Intensity and other characteristics			Intensity and other characteristics			Intensity and other characteristics		
Wavelength	Arc	Spark	Wavelength	Arc	Spark	Wavelength	Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2139.20	4	---	2166.726	---	4	2193.14	6	4
2139.45	---	3	2166.880	2	40	2193.507	10c	8c
2139.59	2	---	2167.29	---	4c	2193.85	5	---
2139.786	---	3	2167.39	10H	1h	2193.933	---	15c
2140.190	---	4	2167.44	---	4	2194.433	---	10
2140.66	---	6c	2167.938	200R	50	2194.561	---	10
2140.924	6	2	2168.42	15	10	2194.68	1	---
2141.329	---	2	2168.77	5	1	2195.284	1	40
2141.545	---	2	2169.240	---	5	2195.84	8	1
2141.745	6	2	2169.49	5	3c	2195.97	10	3
2142.736	10c	20c	2169.62	---	5c	2196.284	---	2
2142.97	20r	.5	2169.77	---	2	2196.72	50cw	10cw
2143.443	4	2	2170.340	5	10	2196.834	---	8
2143.89	3	---	2170.806	2	50	2197.130	---	30c
2143.96	---	8h	2170.970	---	10	2197.373	---	10
2144.085	2	30	2171.145	---	4	2197.44	10c	---
2144.45	10c	5c	2171.267	---	3	2197.610	---	4
2145.01	2	---	2172.094	---	2	2197.928	---	15
2145.41	---	10	2172.618	1	30	2198.213	---	6
2145.69	1	5	2173.233	---	20	2198.401	15	3
2145.90	1	30	2173.39	---	10H	2198.617	5	1
2146.20	3cw	---	2174.05	8	4	2198.914	200R	40
2146.72	---	2	2174.24	10	5	2199.113	---	3
2147.03	---	2	2174.692	---	4	2199.50	10c	---
2147.483	8	4	2175.346	20c	6c	2199.69	7	2
2147.97	6	4	2175.806	20c	10c	2199.82	4	---
2148.13	---	3	2176.016	---	5	2199.96	4	3
2148.261	1	20	2176.206	200R	50	2200.219	---	4
2148.92	3	---	2176.35	---	3	2201.075	8	2
2149.23	---	3	2176.56	---	1	2201.32	---	1
2149.43	5cw	4	2177.28	50Hw	20Hw	2201.640	---	8
2149.59	1	4	2177.382	---	4	2201.68	7	---
2149.818	---	20cw	2177.579	1	20	2201.911	---	20
2150.118	---	2	2177.851	2	100	2202.00	10cw	---
2150.44	2	20	2178.04	6	---	2202.15	7	---
2150.82	---	10c	2178.59	10	5	2202.19	---	10
2151.40	4	3	2178.778	1	20	2202.49	5	3
2151.74	6	2	2178.87	3	---	2202.695	---	2
2152.04	---	2	2179.03	4	---	2202.815	10c	5
2152.79	---	5	2179.09	---	5	2203.010	40	20
2152.98	---	2	2179.18	8c	---	2203.46	---	2
2153.30	8	4	2180.136	5	3	2203.579	1	20
2153.53	---	1	2180.405	30c	10c	2203.71	---	2
2153.79	---	3c	2180.54	---	5	2204.55	20c	7
2154.01	2	1	2180.78	15	---	2205.15	50cw	20c
2154.20	10c	2c	2180.804	---	10	2205.344	---	15c
2154.45	---	6	2181.02	20	10	2205.41	4c	---
2155.056	---	5c	2181.430	---	4	2206.154	2	40
2155.24	2	2	2181.65	3	---	2206.707	---	4
2155.53	---	2	2181.77	---	100cw	2206.76	4	---
2155.73	7	1	2181.81	4	---	2206.870	2	100
2155.86	10	4	2182.374	---	2	2207.376	---	3
2156.103	---	2	2183.158	---	5	2207.680	20	5
2156.23	---	2	2183.443	---	15c	2208.188	---	2
2156.673	100R	50	2183.72	100cwR	10cw	2208.28	2	---
2157.89	4	1	2184.19	---	1	2208.394	2	---
2158.05	---	4cs	2184.540	10	10	2208.58	6	1
2158.292	2	20	2184.73	---	3	2209.045	---	2
2158.73	15cw	8cw	2185.16	20	3	2209.320	---	7
2159.14	7c	4c	2185.215	---	3	2209.800	30	---
2160.04	---	1	2185.915	---	8	2209.87	---	20c
2160.42	10c	8c	2186.356	2	50	2210.02	40H	---
2160.934	---	20	2187.62	3	---	2210.655	6	2
2161.15	15cw	7cw	2187.556	---	4	2210.81	4	2
2161.914	---	10	2187.77	50c	10h	2211.197	10	7
2162.326	---	1	2188.01	10	2	2211.33	10c	---
2162.81	15cw	10cw	2188.221	---	10	2211.52	---	2
2163.07	---	7	2188.38	3	1	2211.933	10	4
2163.10	10	---	2188.50	6	2	2212.088	10	1
2163.56	6	3	2188.755	---	2	2212.211	---	7
2163.704	---	20	2189.60	8	---	2212.495	---	3
2163.72	3	---	2189.870	6	5	2212.809	10	4
2164.29	---	6	2190.260	4	50	2212.900	---	4
2164.56	20cw	10cw	2190.518	10c	10	2213.23	6	1
2164.773	---	4	2191.03	20H	3H	2213.50	2	---
2164.91	6cw	---	2191.471	40c	10c	2213.68	---	20
2165.409	2	30	2192.23	8	---	2213.98	5	---
2165.65	3	---	2192.44	10	---	2214.261	500R	1000cw
2165.901	---	15c	2192.567	---	20c	2214.58	300r	50cw
2166.52	---	2	2192.84	3c	---	2215.353	4	---



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2215.535	2	2	2242.40	30	10	2266.582	-----	4
2215.80	6c	1c	2242.66	50	?	2266.733	-----	2
2216.161	1	50	2243.19	-----	20	2266.889	-----	4
2216.52	-----	5c	2243.261	10	4	2267.256	-----	40
2217.03	-----	3	2243.476	8	1	2267.358	3	-----
2217.158	10c	2	2243.79	8	1	2267.652	20	10
2218.36	8c 3, .21W	-----	2244.112	15	7	2268.08	1	-----
2218.648	-----	1	2244.500	-----	4	2268.41	4	-----
2218.715	15	5	2244.63	-----	3	2268.46	-----	40c
2218.940	-----	7	2244.72	5	1	2268.803	10	2
2218.97	10	-----	2245.120	8	3	2269.061	-----	10c
2219.260	15c	8c	2245.37	50H	5Lr	2269.228	-----	2
2219.75	-----	1	2245.43	-----	9c	2269.613	-----	2
2220.438	-----	2	2245.884	-----	3c	2269.793	2	10
2220.577	10	5	2246.18	2	-----	2270.018	10c	10c
2220.69	-----	2	2246.444	20c	7c	2270.170	8	2
2220.920	2	5	2247.326	-----	10	2270.574	4	1
2221.845	-----	7c	2247.49	3	-----	2270.928	-----	5
2222.32	-----	2	2247.544	-----	9	2271.04	50cw	3c
2222.465	10	3	2247.948	-----	10	2271.300	40r	10
2222.76	15	6	2247.97	3	-----	2271.611	15	10
2222.932	-----	5	2248.55	5	-----	2271.97	2	-----
2223.08	2	-----	2248.63	2	50	2272.15	-----	1
2223.16	5	-----	2248.90	2	-----	2272.644	2	50
2223.20	-----	5	2249.04	2	-----	2272.931	5	1
2223.407	1	20	2249.24	2	-----	2273.14	2	-----
2223.77	3	-----	2249.51	50cw	5cw	2273.98	-----	10
2223.93	-----	6cw	2249.753	-----	1	2274.016	4	-----
2224.31	-----	15h	2250.273	-----	15	2274.20	-----	1
2224.41	5	-----	2250.33	3	-----	2274.618	300R	100c
2224.851	-----	7	2250.632	-----	3	2275.25	200cw	500 c .22W
2226.048	-----	20	2251.148	-----	15	2275.724	-----	1
2226.418	300R	50	2251.273	15	1	2276.41	-----	1
2226.87	50cw	5c	2251.41	2	-----	2276.632	20	5
2227.021	-----	20	2251.593	2	40	2277.012	-----	10
2228.05	30c	10c	2251.76	7c	-----	2277.340	30c	5c
2228.389	-----	8c	2251.94	6	2	2277.926	-----	5
2229.104	1	20	2252.154	-----	10	2278.431	2	-----
2229.61	2	-----	2252.53	4	-----	2278.550	5	3
2230.43	2	-----	2252.61	-----	2	2278.635	-----	1
2230.47	-----	10c	2253.28	-----	8	2278.73	10	10
2230.61	5	-----	2253.48	-----	7cl	2278.948	-----	2
2230.68	-----	1	2253.848	-----	9	2279.15	-----	1
2230.83	10c	-----	2253.94	50cw	5cw	2279.563	2	15
2231.127	-----	8c	2254.196	-----	15	2279.87	-----	1
2231.561	4	-----	2254.790	30	10	2280.00	2	2
2231.92	2	-----	2255.729	100r	30	2280.540	10	3
2232.08	3	1	2255.937	-----	10	2281.07	-----	1
2232.292	4	50	2256.193	150R	50	2281.29	10cs	3c
2232.48	3	-----	2256.74	-----	2	2281.406	-----	10
2232.62	5	-----	2256.935	5	2	2281.620	200R	40
2232.964	-----	3	2257.25	15	5	2282.51	-----	5h
2233.404	-----	1	2258.406	3	-----	2282.980	2	20
2233.84	20	-----	2258.55	-----	8	2283.191	6	2
2233.91	3	10	2258.62	2	-----	2283.568	15	2
2234.07	30c	5c	2258.933	-----	7	2283.69	-----	1
2234.50	20c	3c	2258.98	10	-----	2283.818	5	1
2234.865	-----	10	2259.310	20	10	2284.78	-----	1
2235.110	7	3	2259.796	-----	6	2285.30	50	30
2235.440	50r	20	2260.00	-----	2	2286.608	2	60
2235.803	2c	100c	2260.20	5	-----	2287.003	-----	1
2236.03	-----	5c	2260.500	5	30	2287.17	-----	3
2236.577	-----	6	2260.83	10c	2c	2287.506	400R	100c
2236.77	6	1	2261.38	4	2	2289.178	-----	1
2237.47	2	-----	2261.595	2	-----	2289.688	-----	7
2237.63	8	2	2261.846	1	50c	2290.196	-----	10
2237.85	2	-----	2262.276	15c	5c	2290.715	50cw	20cw
2238.169	-----	10	2262.424	10	4	2291.299	10	5
2238.211	5	-----	2262.773	15c	3c	2291.66	8c	1
2238.348	-----	10	2263.13	5h	2	2291.884	-----	50cw
2238.603	40r	10	2263.617	8	1	2292.327	2	-----
2238.830	-----	3	2263.748	-----	9c	2292.50	1	-----
2238.944	8	4	2263.96	10cw	2	2292.520	-----	2
2239.16	6c	1c	2264.393	200R	100	2292.71	2	1
2240.00	-----	5	2264.98	-----	1h	2293.641	5	2
2240.05	30	10	2265.10	-----	3h	2293.678	-----	10
2240.29	2	-----	2265.416	40c	10c	2294.486	400R	100c
2240.63	30	2	2266.072	30c	10	2295.060	-----	15
2240.977	30	1	2266.18	2	10	2295.217	-----	3
2241.34	-----	2	2266.387	-----	2	2295.661	4	1

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2296.09	-----	1	2318.46	3c	2	2343.46	-----	4
2296.211	15	-----	2319.091	-----	1	2343.78	3c	-----
2296.24	-----	15 <i>cl</i>	2319.19	30 <i>r</i>	10	2344.006	4	-----
2296.926	40 <i>r</i>	10	2319.288	-----	2	2344.19	10	-----
2297.43	1	-----	2320.162	50 <i>r</i>	20	2344.544	-----	1
2297.497	-----	6	2320.78	-----	4	2344.776	100 <i>R</i>	40
2297.81	7	-----	2320.89	-----	4	2345.282	20 <i>r</i>	6
2298.094	8 <i>cw</i>	100 <i>cw</i>	2321.11	4	2	2345.51	-----	10c
2298.35	15c	3	2321.272	8	4	2345.653	30c	10c
2298.586	-----	10	2321.41	10	6	2345.985	3	-----
2299.413	7	1	2321.57	6	4	2346.139	-----	1
2299.686	-----	2	2321.70	10	4	2346.37	4 <i>h</i>	-----
2299.769	20c	20c	2321.75	-----	10	2346.43	-----	2
2299.880	-----	2	2321.91	-----	2	2346.614	8	4
2300.109	6	1	2322.490	50 <i>R</i>	20	2346.774	6	2
2300.613	6c	-----	2322.700	4	2	2346.987	-----	2c
2300.736	-----	15c	2322.89	-----	10c	2347.064	10	2
2301.318	8	2	2322.945	10c	5	2347.288	-----	5
2301.612	-----	7	2323.409	2	60	2347.611	3	10
2301.815	1	40c	2324.108	-----	3	2347.84	3c	-----
2301.884	4	-----	2324.45	-----	10c	2348.22	3 <i>cw</i>	20 <i>cw</i>
2302.25	1	-----	2325.045	20	5	2348.557	4	1
2302.345	-----	6	2325.424	-----	2c	2348.792	8	2
2302.643	8	4	2325.64	-----	1	2349.391	30 <i>r</i>	10
2302.992	150 <i>R</i>	30c	2326.16	2	-----	2349.55	20c	-----
2303.370	3	-----	2326.82	4	-----	2349.61	-----	10 <i>cl</i>
2303.517	10	5	2326.88	10	10	2349.86	-----	1
2303.690	10	5	2327.095	3	-----	2349.94	-----	3
2303.993	-----	30 <i>cw</i>	2327.265	7	-----	2350.31	2	-----
2304.443	8	1	2327.306	-----	100c	2350.46	20	10
2304.587	8	4	2328.189	-----	5	2350.60	20 <i>r</i>	5
2304.714	10	5	2328.664	30 <i>r</i>	10	2350.653	-----	3
2305.021	-----	8	2329.28	4 <i>H</i>	-----	2351.14	4	1
2305.22	4c	-----	2329.89	-----	8 <i>cw</i>	2351.41	-----	3
2305.545	20 <i>cw</i>	2c	2330.18	6	2	2351.925	-----	2
2305.726	10	3	2330.424	8	3	2352.069	100 <i>R</i>	30
2305.934	-----	2	2330.544	5	2	2352.24	-----	3 <i>H</i>
2306.14	-----	-2	2330.706	4	1	2352.481	-----	4
2306.24	2	-----	2330.878	-----	10	2352.59	-----	2
2306.268	2	4	2331.135	20c	10c	2352.790	4	1
2306.540	60 <i>r</i>	20	2331.19	-----	3	2352.900	10	4
2307.03	-----	1	2331.374	8	4	2353.115	-----	30
2307.215	-----	5	2331.599	-----	10	2353.18	5	-----
2307.39	10 <i>cw</i>	2c	2331.73	20c	2	2353.55	-----	4
2308.060	-----	10	2331.81	-----	10	2353.95	30 <i>r</i>	5
2308.167	-----	10	2332.51	-----	2	2354.08	30 <i>r</i>	10c
2308.354	20	2	2332.77	-----	2	2354.372	-----	4c
2308.45	-----	20c	2333.019	15	5	2354.66	4	1
2308.592	30c	4	2333.32	20c	5	2354.773	15	3
2308.658	-----	15	2333.75	-----	1	2355.02	10c	-----
2308.972	-----	3	2333.91	-----	5	2355.423	1	40c
2309.619	-----	30	2334.33	20 <i>r</i>	10	2355.868	10	2
2310.00	3	1	2334.45	10	2	2356.125	-----	10
2310.134	10	3	2335.00	10c	3c	2356.496	30 <i>r</i>	10c
2310.703	-----	3c	2335.61	5	2	2356.62	-----	1
2310.938	-----	-----	2335.730	20 <i>r</i>	10	2357.035	15c	5
2311.189	20	5	2336.04	-----	2	2357.26	5	1
2311.576	8	3	2336.10	20 <i>r</i>	10	2357.60	3	-----
2312.011	7	-----	2336.47	1	15	2357.66	-----	3
2312.109	-----	30c	2336.718	10	4	2357.72	-----	1
2312.200	5	-----	2336.923	2	50	2357.91	-----	10 <i>cw</i>
2312.814	9	5	2337.092	10	4	2358.022	-----	3
2312.971	10 <i>r</i>	8	2337.43	3c	1	2358.570	10	5
2313.12	5	1	2337.953	40 <i>R</i>	20c	2358.940	-----	2
2313.267	-----	10	2338.451	20	5	2359.157	-----	5
2313.340	20	8	2339.04	-----	4	2359.323	-----	1
2313.638	-----	2c	2339.26	3	-----	2359.47	5 <i>H</i>	-----
2313.922	-----	4	2339.48	-----	1	2359.760	-----	1
2313.98	6	-----	2339.71	-----	2	2359.98	4	4
2314.209	-----	2	2339.86	-----	3	2360.287	10	5
2315.186	-----	2	2340.29	3 <i>h</i>	-----	2360.897	10c	2
2315.238	10	4	2340.344	-----	20	2360.94	-----	5c
2315.956	30 <i>r</i>	10	2340.938	-----	7	2361.47	-----	10c
2316.04	-----	2	2341.23	2	-----	2362.078	2	5
2316.49	-----	10c	2341.31	-----	10	2362.415	-----	10
2316.523	30c	10	2341.38	8	7	2362.54	2	10
2317.24	6 <i>cs</i>	2 <i>cs</i>	2342.06	2	-----	2362.64	20c	-----
2317.722	-----	5	2342.18	-----	10	2362.85	20c	-----
2317.889	2	20	2342.731	30	5	2362.89	-----	10c
2318.242	-----	30	2343.320	2	7	2363.805	20	5

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2364.125	-----	5	2388.918	-----	2	2416.265	5	40
2364.23	3c	-----	2389.110	20r	10	2416.30	10	2
2364.44	3	-----	2389.270	5	-----	2416.441	10	7
2364.91	-----	1	2389.379	-----	2	2417.026	-----	6
2365.316	50r	20	2389.62	1	30	2417.661	15	10
2365.666	20r	5	2389.75	-----	3	2417.815	-----	2
2365.90	150R	30	2390.430	20r	10	2417.89	2	-----
2366.078	-----	40	2390.593	15	3	2418.03	-----	3
2366.68	3	6cw	2391.278	30r	10	2418.201	2	30
2366.997	10	5	2391.845	10c	3c	2418.392	4	15
2367.16	-----	4c	2391.94	-----	3	2418.96	-----	6
2367.55	7	-----	2392.36	15	5	2419.404	60r	10
2367.683	50r	20	2392.67	6	3	2419.807	100r	20
2367.75	-----	1	2393.645	50r	10	2419.955	3h	5c
2367.88	10	2	2393.81	-----	40cw	2420.214	-----	10c
2368.062	-----	2c	2393.883	5	-----	2420.28	2	-----
2368.12	4c	-----	2394.252	4	-----	2420.35	5	1
2368.20	-----	4	2394.37	30r	10	2420.72	5	1
2368.527	5c	50c	2394.72	-----	5	2421.38	30	-----
2368.88	15c	5	2395.09	10c	2c	2421.41	-----	60
2368.93	-----	4	2395.33	7H	-----	2421.66	3	-----
2369.152	-----	10	2395.41	-----	3	2421.730	40r	10c
2369.27	50r	15	2395.96	-----	3	2421.883	30r	10
2369.475	10	4	2396.03	7	1	2422.11	2	-----
2369.97	-----	20c	2396.06	-----	4	2422.34	-----	2
2370.762	10	100	2396.13	3	1	2422.60	-----	9
2371.500	30r	10	2396.22	-----	1	2423.112	-----	20
2371.69	-----	1	2396.60	-----	10	2423.50	30c	4h
2371.842	-----	4	2396.791	40r	15	2423.78	10H	-----
2372.610	40c	10c	2397.31	50c	20c	2423.842	10c	100cw
2372.880	-----	7	2397.605	4c	-----	2424.652	10	10
2373.274	7	4	2398.25	10	2	2424.95	2	2
2373.476	10	50	2398.420	2	60	2425.18	-----	1
2373.56	3	-----	2398.58	-----	10cw	2425.38	30c	10c
2373.747	15	4	2398.71	15	3	2425.45	-----	3c
2373.962	1	15	2398.888	15	4	2425.700	7	3
2374.57	-----	3	2399.02	-----	4	2426.195	10	3
2375.073	100r	20c	2399.533	10	3	2426.456	-----	2
2375.33	2	-----	2399.648	6	4	2426.635	30	10
2375.815	15r	10	2400.72	20c	20cw	2427.148	-----	15
2375.93	10	2	2400.893	30	10	2427.21	7	-----
2376.334	4	1	2401.680	30	20c	2427.73	8H	3H
2376.629	10	3	2402.115	15	5	2428.145	3	5
2377.104	10c	3	2402.604	40c	20c	2428.576	300R	60
2377.333	20cH	10c	2403.036	10	50c	2428.84	-----	3
2377.620	-----	10	2403.87	-----	7	2429.097	-----	4
2378.40	3	-----	2404.340	100r	20c	2429.204	10	6
2378.526	5	20	2405.056	300R	70	2429.648	10	7
2378.98	-----	4	2405.602	200r	30	2429.78	8c	2
2379.101	3	20	2405.91	-----	3	2430.515	-----	40
2379.587	-----	3	2406.11	-----	2	2430.750	-----	2
2379.774	40r	15	2406.33	-----	7c	2431.068	-----	5
2379.950	5	-----	2406.695	60r	20c	2431.538	50r	20
2379.992	-----	5c	2407.39	-----	3	2431.744	8	4
2380.225	20c	10c	2408.23	-----	5	2432.18	80c .18W	40cw
2380.63	-----	2	2408.405	4	1	2432.617	5	1
2380.890	15	5	2408.578	3	1	2432.70	20	-----
2381.136	40cw	20c	2408.989	1	20	2432.87	-----	10c
2381.81	6	4	2409.777	-----	7	2433.07	-----	2
2382.07	-----	10	2410.000	1	20	2433.28	20	10
2382.40	5H	2H	2410.28	-----	5	2433.365	-----	5
2383.04	8	4	2410.37	30r	20c	2433.608	5	2
2383.12	-----	7	2410.80	6	2	2433.741	-----	40
2383.46	50r	20	2410.99	40r	20c	2433.803	10	3
2383.97	10h	3h	2411.220	4	-----	2434.536	5c	-----
2384.382	-----	7	2411.245	-----	2	2434.62	-----	20cw
2384.50	10h	3h	2411.947	-----	20c	2435.31	-----	15
2385.02	-----	8	2412.626	-----	2c	2435.82	-----	4d
2385.362	-----	15c	2412.974	-----	3c	2436.046	10	5
2385.48	15	4	2413.216	30	10	2436.48	-----	3c
2385.68	10	2	2413.629	-----	7cw	2436.51	3	2
2385.834	6	-----	2413.741	10	-----	2436.71	5	-----
2386.176	-----	5	2413.81	-----	15	2436.74	-----	10
2386.536	10	100cw	2414.198	-----	7	2436.95	-----	4
2386.895	5c	-----	2414.48	-----	7	2437.23	10	2
2387.458	10	5	2414.587	30r	10	2437.43	1	10
2387.745	20c	5c	2414.99	-----	2h	2437.710	-----	10
2387.92	-----	2	2415.261	4	4	2438.145	5	1
2388.319	-----	5c	2415.84	10c	10c	2438.20	1	8
2388.569	100r	20c	2415.93	4h	4h	2438.462	30	10



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2439.06	30c	10c	2463.141	-----	1	2487.21	5	2
2439.62	4	3	2463.307	15	5	2487.331	200 <i>R</i>	100
2439.84	-----	5 <i>h</i>	2463.84	5	1	2487.362	-----	70 <i>cl</i>
2439.86	3	-----	2463.964	8	2	2488.104	-----	6c
2440.41	30	20	2464.29	-----	1c	2489.04	-----	30 <i>l</i>
2440.58	10	3	2464.63	3	1	2489.335	-----	2
2440.91	-----	1	2465.13	30	8	2489.482	-----	4
2441.05	-----	1	2465.29	-----	10	2490.161	3	50
2441.35	3	10	2465.80	2c	20c	2490.26	2	30
2441.47	100 <i>R</i>	30	2465.97	-----	3 <i>ch</i>	2490.40	-----	3 <i>h</i>
2442.08	-----	1	2466.042	5	-----	2490.50	4	-----
2442.510	40 <i>r</i>	10	2466.546	3	-----	2490.769	8	3
2442.64	-----	1	2466.810	2	20c	2490.91	-----	1
2442.88	2	-----	2467.308	15	2	2491.07	9c	1c
2443.10	-----	10	2467.574	15c	100c	2491.234	2	10
2443.353	20	4	2467.706	2	-----	2491.497	2	-----
2444.09	100 <i>cw</i>	-----	2467.80	4	4	2491.881	1	30
2444.14	-----	7 <i>h</i>	2467.85	20c	20 <i>cl</i>	2492.13	2?	3
2444.54	-----	20	2468.195	-----	10c	2492.537	1	5
2444.943	70 <i>r</i>	15	2468.480	-----	7	2492.55	9	8
2445.085	-----	10 <i>cl</i>	2468.608	-----	4	2492.751	8	3
2445.144	8c	1	2468.695	5	-----	2492.838	3c	3
2446.285	8	3	2469.03	15	15	2493.17	-----	1 <i>h</i>
2446.404	3	1	2469.356	5c	100 <i>cwl</i>	2493.25	-----	2 <i>h</i>
2446.575	-----	10	2470.052	8c	2	2493.461	-----	1
2446.881	10	5	2470.164	4	1	2493.597	-----	2
2446.978	30c	10c	2470.275	3	-----	2494.01	1	-----
2447.656	5	2	2470.610	5	50	2494.217	-----	3 <i>h</i>
2447.852	2	-----	2470.92	3c	-----	2494.250	3	-----
2448.051	5	3	2471.049	2	20	2494.517	-----	1
2448.20	20	4	2471.205	-----	4	2494.609	1	1
2448.26	1	6	2471.426	-----	2 <i>h</i>	2494.709	2	1
2449.033	5c	100c	2471.486	2	-----	2495.141	-----	7
2449.523	20c	20c	2471.93	2	1	2495.263	8c	4
2449.710	60 <i>r</i>	20	2472.006	3	1	2495.386	-----	3 <i>h</i>
2450.320	-----	7	2472.14	2	-----	2495.620	2	1
2450.413	2	-----	2472.55	-----	3	2495.93	5 <i>II</i>	-----
2450.895	30	3	2472.78	-----	1	2496.039	30	20
2451.24	-----	50 <i>II</i>	2473.72	5c	100c	2496.692	10	3
2451.32	2	-----	2474.208	15	2	2497.168	3 <i>h</i>	-----
2451.683	6	1	2474.725	15	7	2497.320	-----	4c
2451.910	8	2	2475.172	10	30	2498.03	4c	-----
2452.067	-----	2	2475.470	-----	5 <i>h</i>	2498.080	-----	6
2452.22	-----	2	2476.197	7	2	2498.215	20	10
2452.63	-----	2c	2476.275	5	-----	2498.566	-----	1
2452.790	2	-----	2476.332	-----	10c	2498.861	20	5
2452.949	3	1	2477.43	-----	100c	2499.19	1	-----
2453.14	40 <i>r</i>	20c	2477.50	10	?	2499.475	7	3
2453.493	10	3	2478.07	5 <i>h</i>	1	2499.608	2	1
2453.936	-----	4c	2478.545	-----	10 <i>cl</i>	2499.968	-----	2
2454.082	3	-----	2478.58	2 <i>h</i>	-----	2500.012	6	2
2454.334	-----	1	2478.99	-----	80	2500.312	10	4
2454.55	-----	2	2479.02	20c	-----	2500.568	10	10
2455.051	4	-----	2479.17	-----	2 <i>h</i>	2501.05	-----	2
2455.097	-----	10	2479.289	1	-----	2501.35	2 <i>h</i>	-----
2455.63	-----	2	2479.541	-----	4	2501.721	50 <i>r</i>	20
2455.827	10c	100c	2480.631	-----	6	2502.09	1	-----
2455.987	20c	4c	2480.820	20c	-----	2502.348	30 <i>cs</i>	200 <i>cw</i>
2456.154	-----	1	2481.12	1	1 <i>h</i>	2503.775	-----	3
2456.435	-----	2	2481.226	4	2	2504.08	-----	2 <i>h</i>
2456.797	-----	8	2481.357	2	-----	2504.36	-----	2
2456.961	10 <i>cs</i>	2 <i>cs</i>	2481.534	2	2 <i>h</i>	2504.493	-----	10 <i>h</i>
2457.36	1c	100 <i>cl</i>	2481.668	4	1	2504.595	20c	30c
2457.596	4c	-----	2481.98	1c	8 <i>cw</i>	2504.861	1	-----
2458.200	-----	1	2483.109	6	2	2505.11	-----	1
2458.577	2	-----	2483.38	5	1	2505.210	-----	4
2458.833	-----	8	2483.920	200 <i>R</i>	80	2505.39	-----	4
2459.105	5	2	2484.12	-----	2 <i>h</i>	2505.43	30 <i>h</i>	-----
2459.62	1	4	2484.406	-----	2	2505.945	30c	20c
2459.672	2	-----	2484.51	2c	-----	2506.585	-----	1
2459.81	4	1	2484.60	-----	3	2506.999	-----	10
2459.89	-----	1	2485.159	10c	2c	2507.403	30c	10
2460.24	20	5	2485.48	-----	5 <i>H<i>ν</i></i>	2507.854	-----	5c
2460.99	-----	3c	2485.50	3c	-----	2508.08	2 <i>h</i>	-----
2461.196	200 <i>R</i>	40	2485.805	20c	10	2508.482	-----	2 <i>h</i>
2461.84	40 <i>cw</i>	200 <i>cw</i>	2486.102	-----	2	2508.861	2	20
2462.181	-----	2	2486.329	-----	2	2508.991	200 <i>R</i>	100c
2462.539	10	3	2486.46	-----	4 <i>cwl</i>	2509.50	-----	2 <i>h</i>
2462.658	-----	2	2486.779	30 <i>cw</i>	6c	2509.562	5c	2 <i>h</i>
2462.915	8 <i>cw</i>	6 <i>cw</i>	2486.970	10c	3	2510.11	-----	20 <i>cw</i>

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2510.771	-----	5	2535.774	-----	10h	2563.006	20c	10c
2511.250	-----	10	2536.398	-----	3	2563.971	2	1
2511.285	-----	10h	2536.510	-----	2	2564.186	50R	20
2511.616	5	2	2536.913	4	1	2564.347	10c	8h
2511.720	2	-----	2537.015	6	3	2564.650	-----	2
2511.944	-----	5	2537.49	-----	5c	2565.297	-----	1h
2512.317	4	1	2537.517	4	2	2565.582	-----	10
2512.414	-----	2	2537.65	5c	2c	2565.839	6	4
2512.550	15	4	2537.877	4	2	2565.967	3	1
2513.87	2h	1h	2539.326	20c	10	2566.366	-----	60
2514.35	2h	2h	2539.727	-----	7	2566.569	8	3
2514.510	20	8	2539.86	1	-----	2566.735	4	1
2514.651	5	2	2540.057	7	5	2566.92	-----	4h
2514.805	3c	1c	2540.45	3	-----	2568.329	5	3
2515.190	-----	2h	2540.513	40r	20	2568.638	10c	300
2515.351	2	2	2540.706	5h	7h	2568.817	2	-----
2515.470	6	5	2541.070	20h	3h	2569.02	4h	-----
2516.120	150r	100	2541.27	20h	3h	2569.192	-----	3h
2516.381	3	2	2541.514	-----	6	2569.327	4c	2
2516.52	-----	3c	2541.651	-----	4h	2569.828	-----	-----
2516.765	2	1	2542.09	3	4h	2570.046	4	3
2517.083	7	4	2542.920	4	2	2570.186	-----	3h
2517.350	7h	4h	2543.022	2	1	2571.255	10	10
2517.99	-----	2h	2543.210	-----	3h	2571.605	1	-----
2518.54	3h	-----	2543.671	10	15	2571.810	10cw	300cw
2518.720	-----	10hw	2543.835	8	5	2572.117	-----	5h
2518.87	5c	-----	2544.215	10	8	2572.476	2h	1h
2519.139	6	2	2544.739	100r	40	2573.760	20c	15c
2520.009	50r	20	2544.878	20cw	20cw	2573.988	3h	1h
2520.658	-----	2h	2544.952	8	5	2574.211	6	5
2521.50	10c	10c	2545.485	30r	30c	2574.686	3	1
2521.59	5	5	2545.258	-----	15h	2575.317	-----	30
2521.691	-----	10h	2546.098	2	1	2575.664	-----	1h
2522.004	5c	2h	2546.450	-----	2	2575.95	6cw	3c
2522.719	5	2	2546.74	1	-----	2576.238	-----	20
2523.190	4	1	2546.02	-----	2h	2576.316	6	3
2523.308	-----	2	2547.398	5	2	2576.408	4	1
2523.415	3	1	2547.521	1	2h	2576.68	1	-----
2523.519	3	1	2548.020	-----	7	2576.818	-----	3cw
2523.798	-----	7	2548.136	10	6	2577.030	3	1
2524.155	5	2	2548.386	-----	3h	2577.614	6	3
2524.30	-----	8h	2548.885	20	10	2578.120	10cW	8cW
2524.546	6	2	2549.372	6	3	2578.862	-----	10
2525.049	2h	-----	2549.847	5hc	-----	2579.005	10c	6c
2525.548	20c	5	2550.091	4c	100cw	2579.343	2	1
2525.653	-----	4	2550.338	4h	-----	2579.590	-----	1
2525.755	-----	10	2550.444	-----	5	2579.778	2h	1h
2526.32	-----	10	2550.613	5h	2	2580.102	-----	4h
2526.37	-----	6	2550.827	1	30cw	2580.203	4	2
2526.536	-----	3	2551.463	2c	2c	2580.311	7	15hl
2526.66	-----	1	2552.021	40r	20	2581.166	-----	4h
2526.809	10	4	2552.73	10c	20c	2581.421	-----	6
2526.905	-----	2h	2553.588	3c	100cw	2581.438	9hl	-----
2527.311	5	2	2554.18	15	10	2581.649	2h	1h
2528.186	-----	2h	2554.630	4	200	2582.111	-----	10cWs
2528.30	3c	-----	2554.929	6	3	2582.240	2	1
2528.486	1	20c	2555.116	2	1	2582.767	10	10
2528.62	1	10cw	2555.24	-----	2h	2582.870	-----	7cw
2528.87	4c	1	2555.32	3	1	2583.146	-----	4
2529.26	-----	2	2555.531	4	3	2583.406	3	2h
2529.50	15c	10	2555.666	5	3	2583.873	4	2
2529.57	-----	3h	2556.512	80R	40	2584.523	6	4
2529.898	-----	4	2556.784	-----	2h	2584.768	10	7
2530.237	-----	4h	2556.918	2	2	2585.061	6	3
2530.260	2	-----	2557.414	-----	20	2585.580	8c	2c
2530.457	3	1	2557.694	-----	15	2586.425	-----	1
2530.93	2h	-----	2558.062	10c	7c	2586.788	50R	30c
2531.404	5c	1h	2559.076	20R	10	2586.998	7	5
2531.672	1	1	2559.478	-----	5h	2587.160	15cw	4c
2532.33	-----	7cw	2559.707	6	3	2588.034	-----	50h
2532.48	5c	2c	2559.882	6	4	2588.297	-----	2
2532.536	-----	5h	2560.366	-----	1	2588.579	-----	60cd
2532.848	5	3	2560.602	-----	1	2588.786	2	1
2532.963	4	2	2560.754	-----	1	2589.218	3	2
2533.119	4	3	2561.184	-----	8h	2589.310	4	2
2533.310	15r	10	2561.27	2	-----	2589.594	6	3
2533.74	1	-----	2561.462	8	5	2590.489	4	2
2534.099	5	80	2561.712	-----	2h	2590.629	3c	1c
2534.805	30cw	20c	2561.920	-----	4	2591.100	5	2
2535.725	1h	-----	2562.051	2h	-----	2591.133	6	6

TABLE 2. Arc and spark spectra of rhenium—Continued

Intensity and other characteristics			Intensity and other characteristics			Intensity and other characteristics		
Wavelength	Arc	Spark	Wavelength	Arc	Spark	Wavelength	Arc	Spark
2591.430	6	3	2620.344	30R	20	2648.100	7	2
2591.582	30r	15	2620.528	3c	1	2648.462	-----	50h
2591.889	10c	5c	2620.937	-----	2h	2648.508	6	-----
2592.843	10cws	5cw	2621.144	10	5	2649.050	50R	40c
2593.048	-----	8h	2621.208	-----	10	2649.584	10	5
2594.267	-----	2	2621.310	5	2	2650.197	-----	10h
2594.854	30R	15cw	2621.779	-----	2	2650.339	-----	8c
2594.982	5	1	2621.870	-----	3	2650.593	-----	4cw
2595.234	60R	30cw	2621.975	15	6	2650.977	-----	2
2596.016	-----	5	2622.276	-----	3	2651.349	-----	2H
2596.404	10c	7	2622.752	40R	20	2651.662	-----	5
2596.780	10r	8	2622.882	3H	1H	2651.903	100R	30
2596.950	15c	10c	2623.285	20cw	10cw	2652.288	-----	2
2597.283	1h	1h	2623.772	2	1	2652.392	6	1
2597.961	9	5	2624.591	-----	10h	2652.506	-----	6h
2598.108	-----	3h	2624.906	-----	2	2652.911	20	10
2598.631	10R	5cw	2625.041	8	3	2653.186	-----	1h
2599.528	7c	2c	2625.128	3	1	2653.485	-----	5h
2599.856	50R	20	2625.154	-----	2h	2653.740	7	4
2600.215	-----	1h	2625.438	-----	2h	2654.120	40R	15
2600.518	5c	2c	2625.806	7	2	2654.390	-----	2h
2600.866	10c	5c	2625.898	-----	2h	2654.773	10	2
2601.874	15c	8c	2626.200	1	-----	2654.908	-----	10cw
2602.550	10c	7c	2626.636	5	2	2655.048	-----	3c
2602.681	-----	2	2626.870	-----	2	2655.178	10	5
2602.926	10	7	2627.450	1	-----	2655.292	-----	1h
2603.462	15	9	2627.868	-----	4h	2655.844	15c	8c
2603.82	47	60hl	2627.880	3	1	2656.392	-----	2h
2603.89	40cw	20c	2628.258	-----	100h	2656.486	2h	-----
2604.832	-----	2h	2629.144	1	-----	2656.846	-----	3
2606.480	-----	10	2629.603	-----	2h	2656.950	5	1
2607.316	8	3	2630.150	8	3	2657.449	10c	5c
2607.612	-----	200cwl	2630.436	-----	8	2657.50	-----	1
2607.936	10c	2c	2630.652	3h	-----	2658.235	-----	7c
2608.043	3	1	2630.754	7	3	2658.688	7	4
2608.501	10	400	2630.861	1	30?	2659.024	20	8
2608.746	3	1	2630.957	2	-----	2659.236	-----	1
2609.085	5	2	2631.569	20cs	8c	2659.510	15cw	2cw
2609.204	5	2	2631.836	-----	6h	2659.552	-----	4
2609.404	9	4	2632.16	-----	20c .16W	2659.792	10	7
2609.705	-----	2	2633.006	10	3	2660.040	2c	-----
2609.839	-----	5	2633.084	-----	8	2660.214	-----	20c
2609.86	2h	-----	2633.614	20	15	2660.342	5	2
2610.120	-----	2h	2633.775	-----	2h	2660.538	7	4
2610.545	-----	20h	2633.892	2	-----	2660.628	8	4
2610.690	4	1	2634.352	10	4	2660.928	-----	7
2610.874	-----	8c	2634.798	-----	2h	2661.034	9	3
2611.536	50R	10	2634.908	2	1	2661.223	2	1
2611.603	40R	15	2635.115	-----	2H	2661.506	1	1
2611.702	5	2	2635.831	3c	200cwl	2661.760	5	2
2612.463	-----	7Hw	2636.019	2	-----	2662.196	4	2
2612.730	10c	3c	2636.637	100R	20	2662.464	-----	4
2612.788	-----	8	2637.006	10c	150c	2663.159	1	1
2612.858	6	2	2638.147	-----	7h	2663.633	50cw	30cw
2612.929	5	2	2638.656	2h	1h	2664.215	10	5
2613.235	10	3	2638.919	3	2	2664.556	-----	1
2613.363	-----	2h	2639.346	-----	3	2664.807	15	6
2613.744	15	6	2640.140	-----	5cw	2664.908	2h	1h
2614.168	2	1	2640.282	8c	2c	2665.688	-----	1
2614.558	50R	20c	2641.021	2	30	2665.90	5Hc	2Hw
2614.856	3	1	2641.173	10	1	2666.224	-----	1
2615.274	-----	2h	2641.300	-----	3	2666.421	1	-----
2615.59	-----	5h	2642.131	1	10	2666.632	-----	2h
2615.676	6	5?	2642.25	-----	30cw	2667.130	20c	9c
2615.76	-----	5h	2642.752	60R	50c	2667.54	-----	4H
2616.042	1	-----	2643.092	3	1	2667.793	10	4
2616.130	-----	2	2643.672	-----	2H	2667.893	-----	4h
2616.215	3h	1h	2644.266	1	5	2668.011	-----	2h
2616.720	4cw	150cwl	2644.563	-----	4h	2668.194	2	-----
2617.112	15	6	2644.701	3	1	2668.887	5H	4H
2617.442	10	5	2644.768	5	2	2669.354	-----	3h
2618.374	4h	4h	2645.212	-----	2H	2669.536	-----	1
2618.71	-----	4h	2645.804	10	4	2669.740	-----	1cw
2618.742	4h	?	2646.100	-----	1h	2669.868	5cw	-----
2618.80	-----	5h	2646.379	9	3	2670.236	20	9
2619.082	-----	4h	2646.513	-----	1h	2670.790	30c	20c
2619.502	-----	1h	2647.128	30R	20c	2671.329	3c	1c
2619.658	1	-----	2647.240	2	1	2671.842	40cw	20c
2619.805	-----	10hs	2647.578	1	20	2672.054	7	4
2620.026	40R	20	2647.798	3h	-----	2672.285	2	-----



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2672.420	5	2	2701.206	3h	2h	2724.934	3c	1
2672.770	20c	6c	2701.556	-----	1h	2725.520	-----	3cw
2674.339	200R	100	2701.726	-----	1h	2725.890	1	15
2674.44	-----	1h	2702.329	-----	20h	2726.323	2	1
2674.594	-----	4h	2702.668	20	8	2726.57	-----	3cl
2674.917	5	2	2703.245	10	6	2726.870	-----	15h
2675.525	2	1	2703.510	2H	1H	2727.34	-----	10c, 19W?
2675.990	10	4	2703.743	-----	3h	2727.548	20c	9c
2676.088	9	2	2704.099	-----	3	2727.998	-----	2h
2676.253	10	3	2704.179	3	1	2728.286	3h	2h
2676.866	6H	3H	2704.369	20c	10	2728.628	10	4
2677.032	30c	20	2704.769	6	2	2729.040	-----	3c
2677.231	-----	2h	2705.076	6c	2c	2729.209	2	1h
2677.416	-----	6h	2706.056	15	7	2729.427	4c	1c
2677.764	15c	8	2706.39	-----	2h	2729.635	10	5
2678.054	3c	1	2706.480	5	2	2729.712	-----	4h
2678.530	-----	4	2706.996	-----	2h	2729.803	-----	2h
2678.857	2	1	2707.074	2h	1	2730.027	-----	10
2679.096	20c	10c	2707.401	15c	3c	2730.247	4c	1c
2679.626	7	3	2707.852	10	5	2730.658	-----	10h
2679.914	30c	20c	2708.322	-----	4h	2730.826	10	2
2681.010	9	4	2708.442	7	3	2730.911	-----	2
2681.838	-----	5H	2709.500	2	1	2731.228	3h	1h
2682.067	-----	2	2709.91	-----	10cw	2731.416	2c	-----
2682.368	5	2	2710.224	20cw	8cw	2731.562	5cl	150cwl
2682.502	7c	3c	2710.36	-----	2h	2732.206	50R	10
2682.888	-----	6h	2710.403	15cws	6c	2732.398	-----	6cw
2683.030	3c	1c	2710.562	-----	5c	2733.04	10cl	300cl
2683.558	40cw	30c	2710.667	1	-----	2733.41	15cw	5cw
2683.688	-----	3h	2711.008	-----	10h	2733.96	5h	2h
2684.382	3	1	2711.298	-----	6h	2734.31	10	4
2684.438	1	-----	2711.382	2	-----	2734.43	-----	2h
2684.697	6c	1	2711.835	-----	1	2734.886	10	5
2684.748	-----	80h	2712.249	2	-----	2735.350	-----	2h
2684.905	3	1	2712.476	20c	9c	2735.74	1c	4cw
2684.980	-----	106cwl	2712.646	-----	8h	2736.270	-----	1h
2685.214	5	2	2712.700	5	1	2736.522	6	5h
2685.311	10	5	2713.024	15c	7c	2736.767	10c	4c
2686.160	2	1	2713.160	10c	7c	2737.556	-----	5h
2686.344	2	1	2713.375	-----	15c	2738.323	15	8
2687.199	6c	2c	2713.664	8	3	2738.625	4c	2
2687.692	-----	3h	2713.828	-----	3h	2738.752	10c	4h
2688.319	-----	3h	2713.99	3H	-----	2739.945	20c	10c
2688.528	100cw	60c	2714.130	-----	2	2740.074	4	2
2689.340	7Hwl	3Hw	2715.052	-----	2h	2740.468	-----	2h
2689.838	-----	2cw	2715.474	300R	150	2741.506	-----	1h
2690.17	1	-----	2715.770	30r	15	2741.967	15c	30c
2690.247	20Hw	20H	2716.054	2	-----	2742.744	7	3
2690.785	30Hw	10H	2716.144	-----	3	2742.856	10	6
2691.262	-----	3cW	2716.246	20cw	7cw	2743.122	2	1
2691.694	-----	30cw	2716.419	5	2	2743.258	4c	1c
2692.596	-----	2h	2716.63	-----	2c	2743.650	3	2
2693.104	-----	30	2716.754	15	7	2743.735	2	1
2693.224	4	2	2717.090	3cw	1cw	2743.874	15	10
2693.719	8	3	2717.219	7c	3c	2744.207	20c	6c
2693.822	8	3	2717.670	-----	10cw	2745.014	2	1
2694.034	3	1	2718.01	3H	2H	2745.264	-----	2H
2694.394	20c	10c	2718.659	-----	3	2745.564	5H	2H
2695.248	-----	8c	2718.789	10c	4c	2745.867	15	6
2695.41	-----	1h	2719.324	-----	2	2747.438	20r	10
2695.562	15c	7h	2719.536	15	6	2747.627	1	-----
2695.668	-----	4h	2719.836	-----	6h	2748.55	-----	20d
2695.91	-----	1	2719.848	9	-----	2750.322	6	1
2696.159	2	1	2720.068	9	7h	2750.564	-----	30c
2696.298	-----	3h	2720.364	2	1	2751.38	2h	1h
2696.376	7cws	4cw	2720.059	10c	3	2751.51	3	1
2696.640	7	2	2721.093	1c	-----	2751.620	-----	6h
2696.988	2h	1	2721.211	-----	5h	2752.494	-----	6cw
2697.265	20cw	10c	2721.316	-----	4h	2752.852	15	7
2697.368	3	1	2721.55	-----	8h	2753.046	30c	20h
2697.804	20cw	10cw	2721.675	7	3	2753.289	-----	2
2698.794	15h	6h	2722.206	60c	50ch	2753.638	2c	100cws
2699.462	-----	5	2722.702	80c	50ch	2754.014	-----	3
2699.580	15c	4c	2723.356	10	3	2754.510	5h	3h
2699.978	3	1	2723.836	30c	20c	2755.212	20c	4c
2700.027	-----	5	2724.046	2	1	2755.330	-----	6h
2700.211	-----	8c	2724.253	-----	3h	2755.854	-----	10h
2700.476	2	-----	2724.361	-----	2h	2756.71	3h	1h
2700.891	8	2	2724.437	5h	2h	2756.806	-----	2
2700.977	2	-----	2724.686	9	3	2756.806	15	6

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2757.700	-----	4h	2786.138	15	9	2816.319	30c	20c
2757.996	40r	15	2786.450	3	1	2816.954	30c	15
2758.05	10h	7h	2786.558	20r	8	2818.444	9c	3c
2758.418	-----	3h	2786.652	-----	5h	2818.474	-----	3h
2758.706	10	4	2787.386	7	4	2818.783	2cw	20cwl
2758.767	3	2	2787.540	1	1	2819.528	4	2
2759.140	-----	1H	2788.207	-----	3h	2819.779	4cw	60cwl
2760.004	2H	2H	2789.026	1	5h	2819.951	50cw	40cw
2760.212	1h	-----	2789.173	7c	2c	2820.01	10r	5?
2760.404	3h	2h	2789.268	15	6	2820.290	4	2
2760.494	-----	1h	2789.58	-----	5cwl	2820.976	4	2
2761.008	3h	2h	2789.65	2H	2H	2821.110	-----	8
2761.502	2h	1h	2790.415	30c	2h	2822.123	15	7
2761.926	20c	8	2790.939	-----	15c	2822.341	-----	3h
2762.786	4	2	2791.04	-----	1h	2822.407	9	1
2763.295	40cwl	15cl	2791.290	50r	30c	2822.494	-----	3h
2763.792	40c	20c	2791.39	-----	1h	2823.193	15	8
2764.704	5h	3h	2791.626	10	5	2823.310	2c	1c
2765.065	-----	2d	2792.010	3	1	2823.592	2	1
2765.282	2	-----	2792.382	3cw	3cw	2823.641	2	1
2765.30	-----	7h	2792.940	2	1	2823.750	2cw	-----
2765.69	-----	30h	2793.654	15c	10c	2823.882	2cw	150cw
2766.051	9	3	2793.896	10c	7c	2824.245	20	7
2766.102	-----	7	2794.036	2	1	2824.365	4c	4
2766.390	30c .13W	20cw	2794.171	9h	3h	2824.596	-----	5h
2766.548	7	4	2794.472	3	1	2824.939	-----	5H
2767.576	5	2	2794.632	-----	20h	2825.458	20	10
2767.744	20	10	2795.028	-----	3h	2825.50	-----	4h
2768.177	-----	2h	2795.426	-----	10h	2825.846	2	1
2768.282	6H	3H	2796.078	10l	3l	2825.952	-----	1cw
2768.851	15	8	2796.467	2	1	2826.670	1h	1h
2768.954	3	1	2796.616	9	3	2826.759	3	1
2769.315	30cw	20cw	2796.958	-----	1h	2826.812	4	2
2769.735	4cw	2c	2797.208	-----	1h	2826.904	-----	1h
2770.030	-----	2	2797.444	7c	3c	2827.284	7	5
2770.130	-----	2cw	2797.992	-----	5h	2827.523	30c	15c
2770.417	70R	30	2798.104	10	5	2827.834	7	3
2770.51	-----	2h	2798.640	3	1	2828.226	10cwl	10c
2770.84	-----	1h	2798.870	-----	5h	2829.164	4	2
2771.609	15c	8c	2798.918	-----	3c	2829.887	10c	4c
2771.994	-----	2	2799.245	3	2h	2830.096	6c	2h
2772.421	8	4	2800.112	8c	4c	2830.352	15h	10h
2772.687	3	1	2800.296	3	1	2830.833	9	3
2773.109	20c	10	2800.621	5	3	2831.162	-----	2h
2773.214	2	1	2800.746	4	1	2831.560	-----	1
2773.602	3	2	2801.184	3c	2h	2831.752	-----	3h
2774.042	-----	3h	2801.562	-----	2h	2831.854	2h	2h
2774.383	10c	4c	2801.993	1	1	2832.245	-----	5h
2774.599	5	2	2802.24	15Hw	5Hw	2832.540	2h	2h
2775.126	10cw	5cw	2802.408	3	2	2832.857	-----	1h
2775.457	2	1	2802.829	10cw	3cw	2833.02	2	1
2775.639	15c	4	2802.97	-----	1	2833.05	-----	4c
2775.948	10cw	6c	2803.053	-----	1	2834.077	40cw	20d
2776.296	-----	3h	2803.28	3cl	20c .10wl	2834.608	15c	6c
2776.560	1	-----	2803.925	-----	10hl	2834.782	-----	4cw
2776.960	9	5	2804.506	5c	2c	2835.034	5	2
2777.223	8	4	2805.105	4c	1c	2835.844	3	1
2777.438	1	1	2805.398	3c	1c	2836.005	6	2
2777.71	15cw	6cw	2805.977	7	3	2836.361	-----	5h
2777.797	-----	50c	2807.510	3h	2h	2836.696	7hs	3h
2778.092	15	9	2807.618	-----	2h	2836.991	-----	8cw
2778.418	3c	1c	2807.86	20cws	10cw	2837.547	15cw	20c
2778.498	10	5	2808.456	4h	2h	2837.972	3h	-----
2779.082	10c	5	2809.109	3	2	2838.109	7	3
2779.290	15c	5c	2809.370	3c	1	2838.238	-----	10
2780.094	-----	3	2809.435	-----	10h	2838.566	3	2
2780.850	15cw	8c	2809.98	2c	1c	2839.06	-----	5c .20Wl
2781.094	-----	4h	2810.330	-----	10h	2839.193	8	3
2781.434	30r	15c	2810.518	2	1	2839.657	-----	3h
2781.714	-----	3h	2811.495	-----	2h	2840.024	-----	4h
2782.101	-----	10h	2812.073	15	7	2840.348	50r	40c
2783.141	7	3	2812.356	20	9	2840.44	-----	2h
2783.570	60cw	40cw	2813.112	15	7	2840.979	3	3
2784.042	-----	3h	2813.53	-----	20h	2841.275	-----	1
2784.389	2c	1c	2813.64	5	2	2841.669	-----	2H
2784.618	-----	1	2813.964	20h	10	2841.798	-----	2h
2785.206	50r	30	2814.676	40R	30	2842.588	-----	2
2785.424	10	5	2815.278	2c	-----	2843.000	60r	50
2785.714	9	4	2815.31	-----	3c	2843.10	-----	3h
2785.960	2	1	2815.640	10	5	2843.562	-----	3h

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2843.665	3	1	2870.000	-----	7h	2901.54	-----	2c
2843.762	-----	5h	2870.397	-----	2h	2902.112	3c	1c
2844.162	20	10	2870.784	-----	3	2902.48	100cl	?
2844.854	-----	1h	2871.102	-----	2	2902.55	?	60cw
2845.040	-----	1h	2871.432	-----	2	2902.886	-----	6
2845.176	6	5	2871.82	30cw	20c	2903.293	1	1
2846.478	8	3	2872.008	-----	3h	2903.760	5	2
2846.970	20c	10c	2872.304	10	5	2904.043	3c	2H
2847.185	-----	5c	2872.668	10c	4c	2904.55	3cl	30c 3, .12Wl
2847.568	-----	7h	2872.73	-----	4c	2904.982	-----	6h
2847.744	6	3	2873.104	3cw	2cw	2905.393	10c	6c
2848.112	2h	2h	2873.840	6	2	2905.584	30c	20c
2848.280	3	1	2875.282	30cw	20d	2905.854	-----	2cw
2848.360	3	1	2875.698	-----	30	2906.016	15c	10c
2848.400	3	1	2876.024	5	3	2906.11	-----	2h
2848.966	-----	10h	2876.860	15	5	2906.775	-----	1h
2849.22	-----	6c .12Wl	2877.528	-----	3h	2907.100	10	5
2849.602	3H	2H	2878.226	-----	5cw	2907.231	1	1h
2850.275	8c	3c	2878.538	1	-----	2907.434	2h	2h
2850.590	-----	3	2879.271	20	10	2908.132	3cw	2cw
2850.975	60r	40	2879.391	3	1	2908.344	20	15
2851.188	-----	3h	2880.212	1	-----	2908.676	-----	4h
2851.720	-----	8h	2880.630	-----	8h	2908.704	2	-----
2851.744	2	-----	2880.840	6	-----	2909.127	-----	4hc
2852.054	10c	3	2880.856	-----	10h	2909.166	2	1
2852.181	6c	2c	2881.546	10	5	2909.820	60r	50
2852.394	9	5	2881.874	-----	60h	2909.93	-----	3h
2852.841	20cw	7cw	2882.226	9	3	2910.084	9	6
2852.966	-----	6h	2882.367	-----	2h	2910.308	-----	10h
2853.740	-----	4h	2883.083	3cw	1cw	2910.818	-----	7hc
2853.776	3Hs	-----	2883.444	30c	20c	2911.094	2	1
2854.122	-----	3h	2883.045	15c	10c	2911.232	8	6
2854.304	-----	1	2884.244	-----	20h	2912.025	3h	3h
2854.434	-----	2	2884.452	7c	2c	2912.580	5	4
2854.740	-----	3cw	2884.636	15	10	2912.915	3	2
2855.334	3H	1H	2885.120	4	3	2913.154	10	8
2855.528	10	5	2885.220	4	3	2913.639	-----	5
2855.772	3c	1c	2885.54	2c	2h	2913.805	4	2
2856.447	-----	1	2885.710	-----	2h	2914.298	-----	1h
2856.720	3H	6h	2885.930	10	3	2914.570	-----	2
2856.908	-----	2h	2886.312	4	1	2915.246	3	2
2857.075	2cw	1H	2886.435	-----	2h	2915.286	2	1
2857.435	10	6	2886.544	7	3	2915.643	-----	2cw
2857.575	-----	8h	2886.774	-----	10h	2916.256	3	2
2857.662	-----	2h	2886.935	15c	6	2916.348	2cw	2c
2857.808	4cw	2cw	2887.307	15c	6	2916.731	-----	20
2857.985	-----	4	2887.676	300R	200	2916.850	5c	3c
2858.250	3	1	2888.06	3cl	40c .10wl	2917.173	-----	1h
2859.445	8c .14Wl	4cw	2888.113	1	4	2917.468	-----	8h
2859.839	10c	-----	2888.456	4	1	2917.484	5	-----
2859.87	-----	15cw	2889.448	20c	10c	2917.834	3cw	2cw
2859.92	-----	2	2889.832	-----	10cw	2918.052	2	1
2860.074	20	6	2891.481	20	10	2918.760	1	1
2860.254	15	5	2891.878	30c	15c	2918.877	7	5
2860.550	-----	20h	2892.093	-----	10c	2919.407	20	15
2860.933	3h	1h	2892.634	20c	10c	2920.608	-----	3h
2861.260	-----	10c	2892.724	-----	3h	2921.076	1	1h
2861.682	-----	10c	2893.475	-----	3c	2921.332	-----	1h
2862.009	2	1	2893.636	-----	3cw	2921.676	3	2
2862.187	8	3	2894.123	1h	1h	2921.804	2h	3h
2862.56	3	1	2894.322	10	6	2922.694	-----	6h
2862.85	-----	6cw	2894.422	2	1	2923.220	2	1h
2862.890	15cw	5cw	2894.969	4H	1H	2923.344	1	1
2863.60	-----	2c	2895.176	-----	2h	2923.686	-----	6h
2864.280	-----	10h	2895.328	2	1	2924.388	-----	1h
2864.563	15c	10c	2895.650	15c	8c	2924.60	20c .15Ws	15cws
2864.831	10c	5c	2896.012	60R	30c .15Wl	2924.784	-----	9h
2864.526	3	-----	2896.446	8	4	2925.195	20	15
2865.554	-----	3h	2896.668	1h	-----	2925.606	2d	-----
2865.612	2	1	2897.022	5	2	2925.703	-----	10h
2866.294	-----	2H	2897.242	-----	10c	2926.124	1	-----
2866.582	3h	1h	2897.401	3c	1c	2926.134	-----	10h
2866.926	3h	2h	2897.456	3	2	2926.661	-----	20h
2867.193	30c	20c	2897.585	10c	6	2926.934	9c	6c
2867.276	3	2	2898.785	10	6	2927.42	40c .14Wl	40cw
2867.770	3H	2H	2899.621	3	2	2927.714	5	4
2869.143	10c	3c	2900.012	-----	6	2927.852	2	5h
2869.200	-----	4c	2900.388	-----	7c	2927.90	-----	2h
2869.764	3c	2h	2900.959	3c	1c	2928.576	7	5
2869.864	3c	2h	2901.352	2c	1h	2929.044	1h	1h



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
2929.48	10c	5c	2962.266	30r	20	2995.786	4	2
2929.530	10	8c	2962.870	15	10	2995.946	2	1
2930.411	4	4h	2964.01	2cw	1c	2996.074	2	4
2930.610	20c	20	2964.458	2	1	2996.182	-----	2
2931.420	1	1	2965.112	80R	80c	2996.533	3	1
2931.660	4	4	2965.502	2	1	2996.842	-----	6
2932.223	4	3	2965.756	150R	150c .15W	2997.124	2	1
2932.317	7	5	2966.416	2	1	2997.420	4	3
2932.657	-----	6h	2966.746	2c	1	2997.686	9c	6c
2933.434	4	3	2967.018	-----	2h	2997.902	4	3
2933.542	-----	7h	2967.246	10	8	2997.980	5	4
2934.010	5	3	2967.415	8cs	10c .17Ws	2998.550	5	4
2934.529	-----	40	2968.044	20c	20c	2998.700	-----	5h
2935.32	6c .15W	5cW	2968.330	3	2	2999.599	200R	150c
2935.752	-----	1h	2968.452	-----	3cvs	2999.947	-----	4h
2936.500	15	15	2968.975	8	9	3000.327	2h	1h
2937.451	-----	1h	2969.374	3	2	3000.581	4	2
2937.810	8	6	2969.74	4Hw	-----	3000.828	-----	3h
2938.442	-----	1h	2969.778	-----	5h	3001.137	20r	20
2938.570	1	1	2970.778	-----	2h	3001.44	-----	2h
2938.644	1	1	2971.596	-----	1h	3002.250	1	1
2938.772	5	3	2971.734	-----	2h	3002.490	1	1
2938.841	2	1	2971.802	2h	2h	3002.633	3c	3c
2938.983	-----	5h	2972.102	5c .15Ws	4cs	3003.626	1	1
2939.557	-----	3	2974.44	-----	4c	3004.136	20c	15c
2939.872	3	2	2974.563	1c	10cw	3004.342	9	8
2940.049	5	4	2974.844	-----	5h	3005.232	4c	2c
2940.554	3	2	2975.023	8	5	3005.69	2H	2H
2940.974	-----	50cl	2975.250	10	10	3005.975	10cw	8cw
2941.141	-----	3h	2975.658	3c	2c	3006.425	20	20
2941.557	9	7	2976.294	40cw	30cw	3007.04	7	5
2942.858	-----	4cw	2977.102	1	-----	3007.19	4	3
2943.145	50r	6c	2977.148	-----	2cw	3007.62	-----	7h
2943.382	10c	8h	2977.300	9c	7c	3008.826	-----	8c
2943.794	-----	8h	2977.844	-----	3	3008.984	-----	2cw
2944.320	8	6	2977.956	2	1	3009.362	-----	8c
2945.106	3c	2c	2978.152	20c	20c	3009.902	2cw	2cw
2945.161	-----	3h	2978.509	1	-----	3010.322	-----	3
2945.708	5h	3h	2978.622	1h	-----	3010.611	-----	2c
2945.886	5	3	2979.345	2c	1c	3010.648	2cw	-----
2946.572	9	7	2980.244	2	1	3010.825	1	1
2946.802	1c	1c	2980.306	4	3	3010.977	-----	2h
2947.49	-----	2H	2980.820	20cw	20c	3011.48	4	3
2947.54	2H	-----	2980.90	-----	50c	3011.92	20c .17Ws	15Ws
2948.104	-----	1h	2981.010	7	4	3012.36	-----	7
2948.384	2h	2h	2981.350	2	1	3013.141	15	15
2948.640	2cw	2cw	2981.495	3c	2c	3013.857	-----	2
2949.088	15c	10c	2981.702	2h	2h	3014.419	-----	7cw
2949.261	7cw	5c	2982.188	50cw	40cw	3014.939	6c	4c
2949.880	10	9	2982.948	2c	1c	3015.362	-----	3h
2950.220	-----	2h	2983.074	1	1	3015.866	4c	3c
2950.731	-----	3h	2983.996	3	3	3016.015	40c .15W	40cw
2950.828	10	7	2984.504	4c	4	3016.480	20cw	20cw
2950.920	7	4	2984.750	7	6	3016.972	6c	5c
2951.690	2h	2h	2985.207	-----	3	3017.294	3c	2c
2952.961	2c	-----	2985.552	4	4	3017.592	4	3
2952.982	-----	3h	2985.822	-----	3cw	3017.891	5c	4c
2953.832	1	2	2986.050	7d	5d	3018.150	2c	1c
2954.335	15c	15c	2988.19	-----	1h	3018.345	-----	1H
2954.454	1	2h	2988.302	1	1	3018.981	-----	5h
2954.580	6	5	2988.471	20c	20c	3019.776	2h	1h
2954.688	5	3	2988.602	3c	2c	3021.881	15	15
2954.968	2	-----	2988.918	4	3	3022.194	-----	2c
2954.99	-----	10c .14Wl	2990.007	2cw	1cw	3022.989	15c	15c
2955.730	-----	8c	2990.326	3	2	3023.573	5	5
2956.086	-----	1h	2990.433	-----	3	3023.858	-----	9cw
2956.254	-----	5	2990.604	-----	5	3024.111	1h	1h
2956.466	3	2	2990.713	1	-----	3024.490	3	2
2957.413	3c	2c	2990.926	-----	5h	3025.058	9	7
2957.762	2cw	1	2991.448	2	1	3025.36	-----	3c .19Wl
2957.907	-----	80cw	2991.828	6	5	3026.203	4	3
2958.904	7	6	2992.363	150R	100c	3026.288	5	4
2959.33	2h	3h	2992.746	-----	10h	3026.555	-----	15cvs
2959.718	2	2	2992.815	10cwl	6cw	3027.128	1	-----
2959.808	2	1	2993.176	8	7	3027.958	2c	1c
2960.296	4cw	3cw	2993.769	-----	1	3028.099	2	1
2961.163	3c	4c	2994.98	-----	1h	3030.446	30c	30c
2961.144	-----	3c .18Wl	2995.118	-----	3cw	3031.266	6	5
2961.744	20cw	15cw	2995.395	20	20	3031.358	2	1
2961.880	2c	2c	2995.69	-----	6c .18Wl	3032.486	-----	1h

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
3032.792	9	7	3071.164	20c	20c	3109.756	8	5
3033.374	-----	2h	3072.452	3	2	3109.983	-----	2
3034.552	20h	15h	3072.708	1	1	3110.326	-----	2h
3035.622	8cwl	7cwl	3072.965	20	20	3110.860	40r	40c
3035.776	-----	3h	3073.722	3cw	2cw	3111.236	2	2
3036.100	1	1	3073.922	2cw	1cw	3111.564	9	8
3036.552	9	8	3074.102	3	2	3112.404	2	2
3037.222	1	-----	3074.657	-----	3cw	3112.594	1	-----
3037.463	4	3	3074.99	-----	3Hw	3113.205	7	5
3037.960	15c	15	3075.02	8Hw	-----	3113.350	-----	2h
3038.368	-----	10	3075.900	1	3	3113.740	-----	1
3038.694	-----	1	3076.142	10cW	8cW	3114.004	-----	3cw
3038.812	-----	2	3076.304	5	4	3114.136	-----	2
3039.804	1h	1h	3076.716	3	4	3114.370	2	1
3040.033	20cws	20cws	3077.44	1	1	3114.631	4	4
3040.592	-----	5	3077.740	3	2	3114.914	3cw	2cw
3041.000	10	9	3077.908	5cw	4cw	3116.720	-----	2
3041.272	4h	4h	3078.864	15c	15c	3116.924	-----	2
3041.760	7c	4c	3079.263	1	-----	3117.414	4	4
3041.993	6	5	3080.048	-----	4	3117.561	-----	2
3042.101	2	1	3080.660	-----	10	3117.652	-----	3
3042.292	8c	8c	3080.922	7cwl	5cwl	3117.776	-----	5
3043.608	2cw	1	3081.656	2c	2c	3118.002	-----	2
3044.084	10	9	3082.050	-----	2h	3118.192	40c .15W's	40cW
3044.969	-----	7	3082.426	50c .13W	40cW	3119.192	4	3
3045.286	3c	2c	3082.772	3	2	3119.288	2	2
3045.732	1	-----	3083.552	1h	1h	3119.744	2	2
3045.780	-----	2h	3084.210	15c	15c	3119.854	3	2
3046.000	5	4	3084.772	5	5	3120.244	3	2
3046.352	2h	1h	3085.344	4	4	3121.360	30c	30c
3046.644	-----	3h	3085.528	3	3	3121.733	4	3
3047.252	30cw	30cs	3086.03	3	2	3122.206	3	3
3048.036	-----	5cw	3087.154	10	8	3122.411	1h	-----
3048.586	4	4	3087.36	-----	7c	3123.161	9	9
3049.802	8cw	6cw	3087.854	-----	6	3123.413	3	3
3050.430	-----	5cws	3088.257	-----	1	3123.622	2h	2h
3050.814	1	1	3088.762	30r	20	3124.134	-----	3h
3051.590	4	3	3089.341	2	1	3124.313	-----	3H
3052.232	5	5	3089.932	10c	10c	3124.956	1c	1
3052.799	3	2	3091.356	-----	1	3125.288	2	2
3052.884	3	2	3092.288	-----	10	3125.384	1	1
3053.629	10	9	3092.304	4	-----	3125.518	10c	10c
3053.766	3	2	3092.607	-----	3c	3126.069	2H	1H
3053.88	-----	1	3093.636	20c	20c	3126.420	1	1
3054.486	-----	2h	3093.994	4	3	3127.521	-----	2
3054.899	9	8	3094.784	3	2	3128.023	-----	1
3055.004	1	5h	3094.998	2	1	3128.353	3	2
3055.172	-----	3h	3095.060	10	10	3128.944	40cw	40cw
3055.980	10c .16W's	10cs	3095.314	-----	4cw	3130.203	-----	7h
3056.136	2	1	3095.788	20cws	20cws	3130.432	2h	1h
3056.454	4	4	3096.312	-----	15	3130.608	1	-----
3056.733	-----	1h	3096.414	7	6	3130.921	-----	2h
3057.538	-----	2h	3097.922	4	4	3131.270	3c	2c
3057.660	10	8	3098.262	3	2	3131.952	-----	20
3057.852	6	5	3098.674	2cw	1c	3132.013	2	-----
3058.149	-----	15	3099.064	-----	2cw	3132.590	2	-----
3058.780	20	20	3099.61	3c .19W	2cw	3132.926	-----	2cw
3060.319	9	9	3099.765	3c	2c	3134.022	10	10
3061.218	4c	3c	3100.672	40R	30	3134.344	2c	1
3061.608	9	9	3100.998	7cw	5cw	3134.438	-----	2cw
3061.844	-----	3	3101.555	1	1	3135.068	10cw	8cw
3061.930	-----	4	3101.700	3	2	3136.178	-----	4cw
3062.040	-----	8	3101.909	2	2	3137.640	-----	4
3062.500	3cw	2cw	3103.655	1	20	3138.026	3	2
3062.636	-----	2	3103.260	2cW	20c .15W	3138.663	-----	1h
3062.954	1	1	3103.709	2cw	1	3138.796	-----	6
3063.383	3c	3c	3104.038	2cw	1cw	3139.263	5	4
3063.762	-----	15	3104.647	10	10	3139.792	10c	9c
3063.984	1	1	3105.082	-----	7h	3139.945	9	7
3064.499	1	1	3105.660	2	2	3140.31	1h	-----
3064.597	7	5	3106.180	-----	1h	3141.254	4c	2
3065.279	5	4	3106.490	2c	1c	3141.381	10	15
3065.576	5	4	3106.948	-----	2h	3141.718	3	2
3066.020	-----	15	3107.298	-----	3c	3141.857	1	1
3067.398	200r	100	3107.436	2	1	3142.018	2	2
3068.762	5	4	3107.864	5c	4c	3142.525	3cw	2cw
3069.022	1cw	1cw	3108.808	100R	60	3142.646	10cw	9cw
3069.714	1	1	3109.156	-----	2h	3142.847	-----	2
3069.942	60r	40c	3109.478	4c	3c	3142.909	2c	1c
3070.679	2cw	1cw	3109.576	-----	6	3143.628	2cw	1c

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
3143.974	-----	1h	3186.292	10	10	3226.37	-----	10hl
3144.86	1	-----	3186.856	1	1	3227.45	8	7
3145.354	-----	1h	3187.800	6cw	5cw	3227.48	8	7
3145.616	4c	3c	3187.956	3	3	3227.618	-----	3
3145.536	10c	8c	3189.750	2c	2c	3227.700	1	1
3147.690	10cw	10cw	3189.916	2c	1c	3227.76	-----	2
3147.911	3	2	3190.170	20	20	3227.82	-----	1
3148.200	6	5	3190.782	20	20	3227.918	-----	2
3148.699	2	1	3191.112	1	-----	3228.329	6c	6c
3150.047	4	4	3192.164	1	1h	3228.428	3	2
3150.529	6	5	3192.362	-----	20c	3228.734	15	15
3151.162	10	9	3192.608	-----	20c	3229.804	1H	2H
3151.402	-----	1	3192.682	4c	3c	3230.954	2	2
3151.498	-----	1	3192.852	1	1	3231.454	1	1
3151.636	40cw	40cw	3192.982	-----	2h	3231.983	1	1
3152.456	1	1	3193.199	10	10	3233.988	1h	1h
3152.822	2h	1h	3193.979	1	1	3235.312	-----	2cw
3153.640	-----	1	3194.097	1	2	3235.944	30	30
3153.79	40r	20c	3194.497	30cw	30cw	3236.990	5cw	5cw
3154.530	3	2	3195.206	-----	15	3237.513	10	10
3155.209	-----	1H	3195.666	3	2	3237.825	2cw	1cw
3156.372	-----	1h	3196.354	1c	1c	3238.363	4c	3c
3156.552	2c	1c	3196.682	-----	1	3238.470	-----	1
3156.827	4	3	3197.248	3	3	3238.804	2	1
3157.348	1h	1h	3197.534	2c	1c	3238.938	2	2
3157.712	4	3	3197.59	-----	2h	3239.156	4	3
3158.306	50c .15W	50cW	3198.06	-----	3h	3239.807	1	1
3158.852	-----	2h	3198.330	-----	3	3240.331	4cw	4cw
3158.992	-----	2h	3198.470	4cw	3c	3241.023	1	1
3159.312	6	5	3198.578	15	15	3241.112	1	1
3159.617	4cw	4cw	3199.257	-----	10cw	3241.466	10	10
3160.121	1	1	3199.486	8c	6c	3241.910	-----	10cw
3160.213	5h	4h	3199.604	2h	1h	3242.174	2	1
3161.692	-----	1h	3200.035	20cw	20cw	3242.701	1	1
3162.208	2	1	3200.725	10	10	3244.464	-----	15l
3162.485	10cw	10cw	3202.224	6	4H	3245.472	-----	1h
3163.243	4	3	3203.560	-----	1h	3246.311	2	80
3163.323	-----	2h	3204.245	100c .22Wl	100cWl	3247.801	2	1
3164.106	5c	4c	3204.682	6	6	3248.547	10	9
3164.412	-----	3h	3205.420	15c	15c	3249.021	-----	1h
3164.520	10	10	3206.470	7cw	5cw	3249.105	2	1
3164.864	7	7	3207.768	10cw	10cw	3250.142	-----	1h
3165.802	7c	6c	3208.222	9	9	3251.548	2	2
3166.476	7	6	3208.582	1	1	3252.259	20	20
3166.609	-----	8h	3208.662	1	-----	3252.482	-----	1
3166.904	7	6	3208.822	2	1	3252.736	2	1
3167.155	10c	10c	3209.323	-----	3h	3253.186	10cw	8cw
3167.594	5	4	3210.564	2c	1c	3253.951	15cw	15cw
3168.374	50cw	50cw	3210.905	-----	5h	3254.488	-----	5cw
3169.097	2c	1c	3211.752	20c	20c	3254.886	2	-----
3169.356	1	-----	3212.379	5	5	3254.936	-----	9h
3170.074	-----	7h	3212.938	15cw	15cw	3255.292	3	2h
3170.346	2	1	3213.152	2	-----	3255.801	5	5
3170.992	10cwl	9cwl	3213.168	-----	6h	3256.286	8	7
3171.533	-----	1h	3213.486	10c	10c	3256.666	2cw	1cw
3173.094	9	9	3213.646	3	2	3256.802	-----	1
3173.242	2h	2h	3213.890	3	3	3256.868	1	1
3173.604	2h	2h	3214.110	9	10	3257.435	-----	1
3174.610	20c	20	3214.646	2c	1c	3257.89	-----	2cw
3174.776	20cw	20cw	3214.818	4	4	3258.055	7cw	5cw
3175.094	-----	2h	3214.967	-----	2	3258.848	40r	40
3175.265	-----	1	3215.078	-----	3c	3259.550	50r	50
3175.367	2	2	3216.316	-----	6cw	3260.052	1	1
3176.084	2	1	3217.13	-----	10c .21Wl	3261.424	-----	5h
3177.714	30r	30	3218.458	-----	3h	3261.559	20c	15c
3177.934	2cw	1cw	3218.653	-----	5h	3262.410	1	1
3178.176	2cw	1c	3218.264	2	1	3262.768	10	10
3178.488	6	5	3219.538	1c	1c	3263.297	-----	3h
3178.612	15	15	3219.712	2	1	3263.361	4	3
3179.344	-----	2h	3219.906	-----	50c	3263.877	1	1
3179.864	2	2h	3220.258	-----	3	3264.090	2cw	2cw
3181.258	3h	2h	3220.466	2	1	3264.534	1h	1h
3181.407	-----	1h	3220.550	-----	6	3265.598	2	1
3181.792	1c	1	3221.194	2cw	1cw	3265.760	2	1
3182.664	7	6	3221.836	-----	15	3266.340	2h	1h
3182.869	100R	100c	3221.860	2	-----	3266.851	15c	15c
3183.910	-----	2	3222.180	-----	1	3267.596	-----	2
3184.760	200R	150c	3222.549	1	1	3268.077	15c	15c
3185.574	250R	200c	3223.512	1	2	3268.278	-----	7h
3186.198	1	1	3224.260	2	1	3268.480	10	15

TABLE 2. Arc and spark spectra of rhenium—Continued

Intensity and other characteristics			Intensity and other characteristics			Intensity and other characteristics		
Wavelength	Arc	Spark	Wavelength	Arc	Spark	Wavelength	Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
3268.782	1	1	3310.953	2cw	-----	3355.626	4	3
3268.894	15c	15c	3311.080	-----	9h	-----	10cl	9cl
3269.033	15c	15c	3312.288	9	8	3356.328	10	10
3270.050	7c	7c	3312.749	-----	1	3356.462	9	8
3271.087	5c	4c	3313.105	2c	2c	3356.821	4	3
3272.780	2	1	3313.948	15	15	3358.021	10	10
3273.282	4	3	3314.52	2h	2h	3358.56	6	5
3274.354	1	1	3315.143	-----	4h	3359.22	10h	10h
3274.658	3	3	3316.062	6cw	6cw	3359.818	10cw	9cw
3275.478	1	1	3316.612	1	1	3360.177	4	3
3276.060	8cw	7cw	3317.013	5	4	3360.755	1	1
3276.544	4cw	3c	3317.152	2	1	3360.879	-----	2h
3277.18	4	1	3317.282	-----	2h	3361.145	10	9
3277.710	20cws	20cw	3317.754	-----	15c	3361.828	3	3
3278.902	3c	2c	3318.155	1	1	3362.284	2cws	1cw
3279.43	1	1	3318.316	1	1	3362.745	15	15
3279.82	1	1	3318.671	10	8	3363.025	6	5
3279.97	2	1	3318.780	-----	30cw	3363.412	-----	4cw
3281.248	5	5	3319.146	1h	1h	3364.58	3cw	3cw
3281.457	2	1	3319.622	1	-----	3365.168	-----	2
3281.850	5c	4c	3320.647	2	1	3365.732	9	8
3282.042	-----	1	3321.124	1	-----	3365.838	8	7
3282.318	3	15	3321.450	6c	4c	3366.180	8cw	8cw
3282.863	4	3	3322.196	9c	8c	3366.418	2cw	1cw
3283.124	4cw	3cw	3322.478	50cws	40cw	3366.892	3	2
3283.907	5	4	3324.20	-----	1h	3367.298	1	-----
3284.454	3	2	3324.510	2cw	2cw	3367.384	1	-----
3285.638	8	5	3324.930	10	9	3367.482	6	4
3285.706	5	4	3325.191	1	1	3367.677	5c	4
3285.954	1	1	3326.086	-----	1h	3367.924	-----	10h
3286.636	-----	3	3326.482	1	1	3368.132	2h	-----
3287.127	10c	10c	3326.896	5cw	3cw	3368.172	-----	2
3287.92	3c	2c	3327.204	5	4	3368.605	8cw	7cw
3288.402	1	1	3327.712	9c	8c	3370.328	1	1
3289.396	-----	1h	3328.172	4c	3c	3370.764	2	2
3289.900	-----	1h	3328.418	-----	1h	3370.902	8c	7c
3290.093	6c	3c	3328.874	3cw	2cw	3371.142	2cw	2cw
3290.580	1h	2h	3329.319	2	2	3372.435	-----	2h
3291.139	1	1	3329.412	-----	4cw	3372.98	-----	2h
3292.088	3	3	3330.116	2	1	3374.150	2c	1h
3292.65	2c	1c	3331.336	-----	4	3375.040	1h	1h
3294.834	10	10	3331.520	15	10	3375.992	-----	2h
3295.168	2c	2c	3332.849	2cw	2c	3376.448	4	3
3295.76	2hs	2hs	3334.130	3c	2c	3377.619	8cw	6cw
3296.099	2c	2c	3335.364	20cws	20cw	3377.743	10	10
3296.696	15c	15c	3335.664	1c	1c	3379.063	6cws	100cw
3296.992	10	8	3336.160	-----	1h	3379.700	20c	20c
3298.184	-----	5cw	3337.250	2	1	3380.308	5cw	5cw
3298.535	-----	2h	3337.312	2	1	3380.544	2	2
3298.662	1	1	3338.178	300R	300	3381.424	9c	8c
3299.143	2	3h	3338.574	-----	20c	3381.576	2cw	3cw
3299.790	-----	10c	3339.35	5c, 21Wl	4cWl	3381.794	5	4
3300.972	10c	7	3339.685	15c	15c	3382.646	3	2
3301.274	-----	1	3340.304	3	3	3383.259	2c	1c
3301.595	15	15	3340.976	1	1	3383.814	1c	-----
3302.230	10	10	3342.245	250R	250	3384.452	30cw	20cw
3302.578	2	10	3342.652	1	1	3385.166	-----	2h
3302.708	1	1	3343.092	1	1	3385.757	40cws	30cw
3302.935	2	2	3344.322	100c	100h	3386.264	2c	2c
3303.208	5cw	50cw	3345.010	4	50	3387.053	2	1
3303.595	6cw	3cw	3345.564	1	5	3387.575	2H	-----
3303.754	15	15	3346.199	40	30	3387.706	-----	2h
3304.394	1	-----	3346.606	4	4	3389.428	20	20
3304.542	-----	5cw	3347.572	8c	7c	3389.767	8	7
3304.833	5c	3c	3348.292	2cw	2cw	3390.032	4c	3c
3305.156	-----	1h	3348.508	1	1	3390.254	30cw	20cw
3306.484	3	2	3348.640	2	2	3390.970	1	2
3307.007	10c	10c	3349.150	2c	2c	3391.052	1	1
3307.454	1	1	3349.569	-----	3h	3391.256	5hw	3hw
3307.972	2	2	3349.828	4cw	3cw	3392.376	8c	8c
3308.246	9	8	3349.916	8	7	3392.988	1	1
3308.38	1	20	3350.094	4c	3c	3394.122	8	7
3308.468	-----	5	3351.136	2	2	3394.430	1	1
3308.54	1	20	3351.948	4	4	3395.650	2	2
3308.872	8c	6c	3352.521	1	1	3397.210	9	9
3309.164	1	1	3353.208	20c	15c	3397.686	5	5
3309.324	7	6	3353.648	1	1	3398.404	3	2
3309.585	3	3	3353.84	-----	1h	3398.793	8c	7c
3309.795	1	1	3354.36	-----	2h	3399.302	400R	300c, 16cW
3310.276	2h	2h	3355.288	30cl	20cl	3399.963	2c	2c



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
3400.844	3c	3h	3446.743	1	1	3495.904	10c .21Wl	8cWl
3401.168	10cws	10cw	3447.359	2	1	3496.13	3cws	3cw
3402.71	-----	2cw	3447.801	1h	1	3497.696	-----	7h
3402.97	1	-----	3447.915	2	2	3498.630	-----	3h
3403.20	1	1	3449.333	15	10	3500.24	-----	2h
3403.59	3c .22wl	1cw	3449.407	15	10	3500.32	-----	1h
3403.718	-----	20	3451.880	4000R	3000c 6, .142Wl	3502.021	2h	1h
3404.438	1	1	3452.649	-----	4h	3502.25	-----	3h
3404.724	80R	60	3453.280	15	10	3502.727	9c	7c
3405.12	1h	2h	3453.495	50c	50c	3503.056	40c	40
3405.888	60c	50c	3454.006	2h	-----	3503.305	4	2
3406.388	3	2	3454.041	-----	4h	3503.522	4c .21Wl	3cW
3407.79	-----	10c .21Ws	3454.23	-----	3h	3503.748	5cw	4cw
3408.673	30c	20c	3455.327	-----	2cw	3505.375	2	2h
3409.831	15	20	3455.680	-----	3h	3505.68	-----	-----
3409.960	2	2?	3455.988	-----	3h	3506.177	3	2
3410.282	1	1	3457.077	-----	2h	3506.390	10c	7c
3410.44	1h	1h	3457.246	-----	1	3507.334	3c	2c
3411.507	3	3	3457.360	-----	2h	3508.626	1	1
3411.703	-----	3	3457.956	1	1	3509.288	2cw	1H
3412.701	5cwl	3cwl	3458.458	2	2	3509.432	-----	5
3413.150	2	1	3458.881	15	15	3510.333	1	1
3413.744	10	10	3460.465	10000R	7000c 6, .222Wl	3510.61	-----	2h
3414.380	2	2	3461.24	-----	3H	3510.889	10c	6c
3414.605	2c	2c	3461.654	1	2	3511.343	4cwl	4cw
3414.760	3c	3c	3461.965	-----	4h	3512.280	20c .23Wl	15cW
3415.900	-----	4cw	3463.053	2c	2c	3512.65	2c	1
3417.274	-----	5	3464.726	7000R	5000c 6, .189Wl	3515.01	5c	4c
3417.767	40c	30c	3465.988	10	10	3515.756	5	4
3418.330	1	-----	3467.093	1c	1c	3516.146	5c	3c
3418.933	2	2	3467.284	-----	2h	3516.646	40c	40c
3419.242	5	4	3467.656	1h	1h	3517.326	60c	50c
3419.410	60r	50	3467.960	80cw	80cw	3518.245	-----	2h
3420.754	20c	15c	3468.645	4	4	3520.723	15c .19Wl	10cW
3421.218	1	-----	3470.75	2	2	3521.041	1	-----
3421.582	5	4	3470.976	1h	1h	3521.507	3	2
3422.923	1h	1h	3471.657	2c	1c	3521.746	4	3
3423.17	1	1	3471.923	6c	4c	3522.171	6	4
3423.737	1d	1d	3472.071	8cw	6cw	3522.321	8c	6c
3424.620	600R	500c .22W	3472.723	30	20	3522.528	4c	3c
3425.412	3c	2c	3472.875	7	4	3523.170	-----	6
3426.189	40r	50	3473.000	2	1	3523.779	2h	1h
3426.527	2	1	3473.467	6	4	3524.539	4	3
3426.67	1c	1c	3473.688	-----	6	3524.736	3cw	2cw
3426.884	3c	2h	3474.183	10c .20Wl	6cW	3525.259	3	2
3427.61	50cw	40cw	3474.700	5c	4c	3525.64	-----	1h
3427.964	-----	2h	3475.201	5	5	3526.21	2h	1h
3428.513	7	6	3476.031	4cw	3c	3526.368	3	1
3428.826	6	4	3476.442	30	20	3526.734	20	10
3429.611	-----	6h	3477.143	8	7	3527.118	-----	5h
3429.780	2	1	3477.920	-----	1	3527.229	2	1
3430.44	1	-----	3478.322	-----	1	3528.214	4c	2c
3430.80	1	1h	3478.491	3cw	3c	3528.516	1	-----
3431.818	4	3	3478.629	4cw	4cw	3529.213	15	10
3432.382	2c	2c	3478.991	-----	2h	3529.545	2	1
3432.668	5	3	3479.529	2	1	3529.74	4	2
3433.198	4	3	3480.381	30	30	3529.81	5	3
3433.557	1	1	3480.852	40	40	3530.41	-----	3h
3433.828	1cw	30cws	3481.398	1h	1h	3530.893	4cw	3cw
3434.834	-----	15h	3482.233	40c	40c	3531.795	2cw	1cw
3436.193	3	1	3482.853	2cw	2cw	3532.69	2H	3H
3436.39	1c	-----	3484.365	5	4	3533.412	2	-----
3437.714	50c	30c	3484.728	5	3	3533.503	-----	2
3438.589	4	4	3485.35	-----	4cws	3534.245	4c	2c
3439.027	2c	1	3486.183	1	40h	3534.822	20	15
3439.168	1	1	3487.521	4cwl	3cw	3535.30	1	-----
3439.67	2h	1h	3488.013	1cw	1cw	3536.157	5	3
3439.776	3	2	3488.77	4cwl	3cw	3536.88	1cw	1cw
3440.173	2h	1h	3488.87	4cw	3cw	3537.462	50cwl	40cw
3440.52	-----	2cw	3489.850	5c .20Ws	4cW	3537.69	-----	3h
3440.843	5	3	3490.860	10c	8c	3538.36	10c	6c
3441.247	15cw	10c	3491.433	4	3	3538.784	2	2
3441.692	-----	20cwl	3491.772	2c	1c	3539.022	1	1
3442.13	4c .16Wl	2cW	3492.372	2	1	3539.329	20	15
3442.407	2h	2h	3492.545	2c	1c	3539.813	-----	80h
3442.722	5h	3h	3492.953	2	2	3539.944	10c	6c
3442.967	10	8	3493.863	-----	3Hw	3540.223	1	1
3444.964	3cw	2c	3494.06	2cw	2cw	3541.340	3c	2c
3446.256	1	-----	3494.725	10	8	3542.735	-----	30h
3446.43	-----	30c .33Ws	3495.415	1	1	3543.688	5	3

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
3544.277	-----	3	3595.887	2c	1c	3654.935	8c	4c
3544.370	4	3	3596.230	10c	5c	3656.230	2c	1c
3544.656	2cws	1cw	3596.392	20	10	3656.834	-----	7h
3545.41	-----	2h	3597.039	3	2	3658.084	-----	10hws
3546.33	-----	3cw	3598.767	15	8	3658.735	7cw	3c
3546.466	4	2	3600.803	2c	1c	3660.162	2	4
3547.024	3	2	3601.161	1	1	3660.17	-----	3h
3548.106	8	4	3601.600	-----	3h	3660.515	20c	10c
3549.319	5	3	3603.795	1	-----	3662.126	10	5
3549.891	50	30	3604.394	15cwl	8cl	3663.034	5	3
3550.644	2	3	3605.25	-----	3Hw	3665.251	2	1
3551.294	4cws	20cw	3605.332	2	1	3665.522	2	2
3551.58	10c 3, .14W	5cW	3605.971	2c	1c	3667.33	-----	1h
3553.078	2c	1	3606.558	4	3	3668.496	-----	7h
3553.50	3cw	2cw	3607.232	10	4	3669.159	3	2
3553.650	20c	10c	3607.833	2	1	3669.436	8	4
3556.935	-----	7h	3608.661	10cw	4cw	3669.778	40c	20c
3557.93	-----	5H	3609.330	-----	2c	3669.993	7cws	2cw
3558.15	-----	4H	3610.492	30cwl	15cwl	3670.358	10c	6c
3558.935	30cw	20cw	3610.65	-----	2h	3670.528	50	30
3559.239	1	1	3611.01	-----	1h	3672.407	20	10
3559.407	6	3	3611.10	-----	2h	3673.54	-----	2h
3561.078	2	1	3611.437	2c	1	3673.868	2c	1c
3561.140	3	2	3611.80	-----	1h	3674.182	2	1
3561.83	-----	2h	3611.996	-----	3h	3674.87	-----	15cw
3562.454	10c	6c	3612.774	5c .24Wl	3cW	3675.093	3	1
3562.634	-----	2h	3613.41	-----	2Hw	3676.000	15	8
3563.233	3	2	3613.62	-----	2Hw	3676.570	4	2
3563.653	3cwl	1cw	3615.372	8cw	4cw	3677.722	2	1
3564.280	-----	2h	3615.426	4	2	3678.392	6	3
3564.732	20	10	3616.427	3	2	3679.050	3c	2c
3565.195	5	3	3617.085	80c	40c	3680.206	10	6
3565.706	1	-----	3617.252	20	10	3681.284	8	4
3566.213	3c	2c	3617.859	20cws	10cw	3681.407	2c	1c
3566.373	2	1	3618.192	1c	-----	3681.834	4c	2c
3566.816	4	2	3619.203	1	1	3682.155	5c	2c
3566.964	4cwl	2cw	3619.390	3	2	3682.714	8cwl	3cw
3567.600	1	-----	3619.83	3Hw	1Hw	3685.303	1c	-----
3568.234	30cwl	15cw	3620.145	2	1	3685.444	2c	1
3568.780	2c	1c	3620.230	2	1	3685.803	-----	8h
3569.27	-----	2H	3621.460	30cwl	15cwl	3686.452	3	2
3570.255	30	20	3622.183	10c	5c	3688.646	6c	3c
3570.485	1	-----	3622.265	2c	2h	3688.897	10	4
3571.052	2c	-----	3623.980	6h	5h	3689.26	-----	8h
3571.694	8c	6c	3624.11	-----	4h	3689.504	150cws	80cws
3571.857	1	-----	3625.908	20	10	3689.824	1	1
3572.213	2	1	3626.053	8	4	3690.394	15	7
3572.804	8	4	3626.80	-----	3H	3690.547	1	1
3572.961	2cw	1c	3628.116	3h	2h	3690.614	1	1
3573.263	-----	3h	3629.200	20	7	3691.385	20	10
3573.730	3cl	2c	3629.694	3h	1h	3691.48	200c	100c
3574.75	-----	2H	3630.69	2h	1h	3692.115	10cw	4cw
3575.10	-----	4Hw	3632.154	2	1	3692.783	-----	10h
3575.197	2c	1c	3632.615	1	1	3692.808	2	-----
3576.93	-----	2Hw	3635.352	-----	3h	3693.636	-----	4h
3577.09	1	-----	3636.772	4	2	3693.664	2	-----
3577.325	6	2	3637.064	40	20	3695.313	2	1
3577.923	1	1	3637.228	10	5	3695.424	-----	5hc
3578.054	2	1	3637.732	15	5	3695.600	3c	1c
3578.690	2	1	3637.848	60	40	3696.800	1	-----
3578.977	2c	1c	3639.12	10Hw	5Hw	3697.124	2	1
3579.125	60c	30c	3640.75	-----	7h	3697.710	20cwl	10cwl
3580.15	10c .16Wl	300cW	3641.202	2	1	3697.932	-----	20h
3580.970	50c	30c	3642.986	15	5	3698.565	-----	30h
3581.434	-----	6h	3643.712	4	3	3699.780	2c	1c
3583.02	80cws	50cws	3644.924	3	2	3700.374	10cwl	5cwl
3583.146	7	3	3645.33	5c .18Ws	2cWs	3700.579	2c	1h
3585.030	15cwl	10cw	3645.590	8	3	3700.684	2d	1h
3585.329	10d	4d	3646.636	5	2	3701.184	4c	2c
3586.538	2h	1h	3646.69	1	1	3702.098	5	3
3586.842	1	1	3647.544	-----	10hc	3702.74	-----	2hw
3588.628	1c	-----	3649.210	2c	1	3703.243	100	60
3589.264	2c	1c	3649.47	6c	3c	3703.53	1	-----
3590.878	10	5	3651.656	20c .16Wl	10cW	3704.450	20c	10
3591.86	1	-----	3651.972	80c	40c	3704.842	10cws	5cw
3593.388	10cs	4c	3652.29	2c	1	3705.02	20c	10c
3593.91	-----	10cwl	3652.563	2	1	3705.686	8c	4c
3595.164	15c	8	3653.17	3H	-----	3706.268	2h	1h
3595.32	2h	1h	3653.621	15c	5	3707.192	-----	8h
3595.600	1	1	3654.366	4c	2c	3708.774	6h	2h

TABLE 2. Arc and spark spectra of rhenium—Continued

Intensity and other characteristics			Intensity and other characteristics			Intensity and other characteristics		
Wavelength	Arc	Spark	Wavelength	Arc	Spark	Wavelength	Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
3709.47	10c 6, .26Wl	5cWl	3770.738	8c	4c	3836.098	2	1
3709.930	60c	30c	3771.252	2h	1h	3836.525	-----	8h
3710.22	-----	5h	3773.018	-----	15cw	3836.621	-----	10h
3710.64	2	1	3774.83	2c	1	3831.028	3c	1
3710.70	2	1	3775.460	3	1	3832.402	8cwl	3cw
3711.46	5cw	2cw	3776.300	-----	20c .24Wl	3832.92	-----	2h
3711.844	4cw	2cw	3776.70	-----	2h	3833.762	70c	40c
3712.10	-----	1h	3777.05	-----	5h	3834.235	100	50
3712.920	5h	2h	3777.63	20	10	3836.305	70c	40c
3713.160	10cw	5cw	3777.69	30	15	3836.786	-----	20cw
3714.02	2cw	1cw	3778.084	3	2	3837.088	1h	-----
3714.51	-----	10h	3778.535	2	1	3837.696	2h	1h
3714.530	1c	-----	3779.82	-----	3h	3837.894	2h	1h
3714.712	1c	-----	3780.357	15	7	3838.654	3c	1c
3714.995	5	2	3780.54	2	1	3839.540	-----	10h
3715.042	5	2	3781.864	4c	2c	3840.08	1h	-----
3715.702	2c	1	3782.21	-----	3h	3841.498	10	5
3717.285	100c .16Wl	50cW	3782.95	-----	3h	3843.415	60c .19Ws	20cW
3717.44	20c	8c	3784.179	15	6	3845.891	2cw	1cw
3720.860	2h	1	3784.496	3h	2h	3846.857	7	3
3721.146	4cwl	2cw	3785.535	2c	1c	3847.27	-----	2
3725.760	2000R	1000	3786.182	2	1	3847.38	-----	1h
3726.502	8	4	3787.192	10	6	3847.72	-----	10Hw
3726.68	4	2	3787.520	156cw	80cwl	3848.95	3cwl	2cwl
3726.752	4	2	3788.009	2	1	3851.988	15	8
3727.498	7	4	3788.144	3s	1	3852.689	5c	2c
3729.408	2Hw	1Hw	3789.212	4c	2c	3855.936	30c	15c
3729.684	1h	-----	3789.771	4c	2c	3856.72	-----	2h
3729.820	2	1	3790.33	5Hw	3Hw	3858.301	1	1
3730.08	-----	2h	3791.57	-----	2	3858.528	-----	5h
3730.596	2H	1H	3792.165	3	1	3858.584	1	-----
3730.89	-----	5Hc	3794.35	-----	2Hw	3859.328	2	1
3731.662	-----	10Hcw	3795.505	3	1	3859.450	2	1
3731.870	20	10	3795.800	10c 6, .21Ws	5cWs	3860.862	9	4
3732.058	-----	5Hcw	3796.590	50cw	30cw	3861.647	6	2
3732.278	40c	20c	3797.586	50	30	3862.103	6c	3c
3735.01	20cws	10cw	3798.252	3	1	3863.153	5	2
3735.314	1000c	500c	3799.86	-----	2h	3863.768	15	7
3736.193	4h	2	3800.561	4cw	2cw	3863.932	4cw	2cw
3736.838	10c	5c	3800.95	2cw	100cw	3864.108	4	2
3737.697	2h	1h	3801.53	-----	1	3864.766	4	2
3737.806	1	1	3801.742	3	2	3865.126	1	-----
3738.538	1	-----	3802.113	-----	4	3865.875	2h	1h
3739.575	4c	2c	3802.21	2	1	3867.21	2cw	1cw
3739.82	-----	3H	3802.33	-----	2	3868.213	2	1
3740.10	200c	100c	3804.527	2c	1	3869.14	-----	1h
3740.414	30	10	3805.41	5cw	3cw	3869.944	100cw	50cwl
3742.257	2	200h	3807.193	1c	-----	3873.037	3	2
3742.334	1	60h	3807.433	1	-----	3873.501	6Hw	2
3743.072	2	1	3807.742	40	20	3873.870	4	2
3743.194	1	1	3808.200	10dl	3dl	3875.26	100cws	50cws
3743.572	2	1	3808.640	2cw	1cw	3876.861	150c .16Ws	70cWs
3744.53	-----	2H	3809.752	3	2	3878.868	20	10
3745.436	80cw	40cw	3810.098	20c	10c	3879.016	10c	4c
3746.441	1h	1h	3811.38	-----	2h	3880.336	2	1
3746.923	9h	5h	3812.259	20c	10c	3881.89	40	15
3749.010	5h	3h	3812.812	7c	4c	3881.97	7	3
3750.19	-----	1h	3814.24	-----	1Hw	3883.958	5c	3c
3750.666	5	2	3815.655	40c	20c	3884.888	2h	1h
3751.088	2	1	3816.294	2	1	3886.21	-----	5h
3751.555	1h	-----	3816.73	-----	1Hw	3887.29	-----	2
3752.15	-----	4h	3816.95	2h	1h	3887.488	40c	20c
3752.718	2	1	3817.539	30c .19Ws	15cW	3887.950	40c	15c
3752.864	4cw	2cw	3818.655	5c .20Wl	2cW	3888.09	4h	2h
3753.052	2cw	1cw	3819.327	1	-----	3888.92	-----	7cws
3753.316	1	-----	3819.627	1	-----	3889.36	2cw	1cw
3753.770	2c	1	3819.940	3c	2c	3889.962	40cl	15cl
3755.624	15	7	3820.21	1	-----	3890.309	2c	1c
3756.356	2	1	3821.43	-----	2	3890.54	1	-----
3757.00	-----	1h	3821.598	3cwl	1cw	3891.399	10	5
3757.622	15cws	7cws	3821.962	2h	1h	3893.48	5c .23Wl	2cW
5758.51	1h	-----	3823.478	3c	2c	3893.59	-----	2h
3759.749	2	1	3823.772	10c .18Wl	5cW	3893.914	5cl	3cl
3761.046	6cw	5cw	3825.30	-----	2Hw	3895.41	4c	2c
3765.08	2h	1h	3826.55	-----	2h	3896.110	30c	10c
3765.878	2	1	3827.04	15c 6, .24Wl	6cWl	3896.40	1	-----
3766.480	15	5	3827.625	9dl	4dl	3898.41	2c	1
3768.260	5h	2h	3828.325	50	30	3898.50	-----	5h
3768.846	2cw	1cw	3829.80	20	10	3898.55	1	-----
3769.297	5d	2d	3829.83	10	5	3898.65	1	-----

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
3900.24	-----	2 <i>cvl</i>	3964.279	5 <i>c</i>	3 <i>c</i>	4041.305	3	1
3900.34	2 <i>cl</i>	1 <i>h</i>	3964.53	2 <i>c</i>	1 <i>c</i>	4042.78	-----	3
3900.50	3	1	3964.810	15	7	4043.10	-----	3
3900.85	6	3	3965.27	1 <i>c</i>	-----	4044.798	3 <i>c</i>	1 <i>c</i>
3900.907	30	10	3965.59	-----	2 <i>Hw</i>	4045.237	4 <i>c</i>	2 <i>c</i>
3901.092	20	8	3967.39	30 <i>cw</i>	15 <i>cw</i>	4045.94	2	1
3902.580	5	3	3967.707	2 <i>c</i>	1 <i>c</i>	4047.106	2	1
3902.82	3	2	3970.93	-----	1 <i>h</i>	4048.99	80 <i>c</i>	40 <i>cs</i>
3905.12	10 <i>cl</i>	5 <i>cl</i>	3971.47	-----	1 <i>h</i>	4050.926	10	4
3907.20	3 <i>cw</i>	1 <i>c</i>	3971.63	-----	3 <i>Hw</i>	4051.200	2	1
3907.74	3	1	3975.374	3	1	4051.45	-----	2 <i>h</i>
3908.210	40	20	3975.648	20 <i>c</i>	8 <i>c</i>	4052.852	3	1
3909.84	1	-----	3976.759	4 <i>cvl</i>	2 <i>cvl</i>	4053.36	3 <i>c</i>	2 <i>c</i>
3910.157	2	1	3978.620	10 <i>Hw</i>	5 <i>Hw</i>	4054.265	15 <i>c</i>	7 <i>c</i>
3910.272	2	1	3979.66	-----	2 <i>Hw</i>	4054.59	1	-----
3910.59	-----	3 <i>h</i>	3981.14	-----	2 <i>Hw</i>	4055.330	20 <i>Hw</i>	10 <i>Hw</i>
3911.76	2 <i>c</i>	1 <i>c</i>	3981.455	7	3	4056.91	-----	10 <i>h</i>
3913.49	-----	3 <i>hw</i>	3982.286	7 <i>cs</i>	3 <i>cw</i>	4057.001	10	4
3913.924	60	30	3983.41	10 <i>c</i> 6, .27 <i>Ws</i>	4 <i>c</i> <i>Ws</i>	4058.68	2	1
3915.234	2 <i>c</i>	1 <i>c</i>	3983.91	15 <i>cw</i>	5 <i>cw</i>	4058.81	-----	2 <i>h</i>
3915.382	-----	10 <i>h</i>	3984.200	-----	50 <i>h</i>	4059.753	2 <i>c</i>	1 <i>c</i>
3917.270	200 <i>cw</i>	100 <i>cw</i>	3984.254	10 <i>H</i>	2 <i>h</i>	4061.643	3 <i>cw</i>	2 <i>cw</i>
3919.076	10 <i>cw</i>	4 <i>cw</i>	3984.28	-----	10 <i>h</i>	4061.856	30	15
3920.85	20 <i>c</i> .20 <i>Ws</i>	10 <i>c</i> <i>W</i>	3984.74	2 <i>cw</i>	1 <i>cw</i>	4062.40	-----	4 <i>h</i>
3921.759	10 <i>c</i>	5 <i>c</i>	3985.31	1	-----	4064.328	15 <i>h</i>	5 <i>h</i>
3922.274	10	5	3985.42	1	-----	4064.920	5 <i>cvl</i>	3 <i>cw</i>
3923.58	5 <i>cs</i>	2 <i>cw</i>	3987.086	5 <i>h</i>	2 <i>h</i>	4066.94	2 <i>c</i>	1 <i>c</i>
3924.090	10 <i>c</i>	4 <i>c</i>	3987.83	-----	2 <i>Hw</i>	4067.246	2	1
3924.67	4 <i>c</i> .25 <i>Wl</i>	2 <i>c</i> <i>W</i>	3987.915	4	2	4067.44	1	1
3925.038	2 <i>c</i>	1 <i>c</i>	3988.63	-----	3 <i>Hw</i>	4069.12	-----	30 <i>c</i> .26 <i>Wl</i>
3925.63	2	1	3990.660	15	6	4069.16	1 <i>c</i> .15 <i>Wl</i>	?
3926.14	-----	2	3990.83	-----	2	4072.36	1	-----
3926.28	-----	4 <i>Hw</i>	3991.033	30 <i>cs</i>	10 <i>cw</i>	4073.060	4 <i>c</i>	2 <i>c</i>
3926.522	10 <i>c</i>	4 <i>c</i>	3991.571	10 <i>cw</i>	5 <i>cw</i>	4074.01	2 <i>c</i>	1
3926.85	4 <i>cvl</i>	2 <i>cvl</i>	3992.72	10 <i>cs</i>	4 <i>cw</i>	4075.09	1 <i>h</i>	-----
3927.31	-----	1 <i>h</i>	3993.20	-----	2 <i>Hw</i>	4078.120	8	4
3927.59	30 <i>c</i> .20 <i>Ws</i>	15 <i>c</i> <i>Ws</i>	3994.154	4 <i>d</i>	2 <i>c</i>	4079.364	10 <i>c</i>	5 <i>c</i>
3928.364	2	1	3995.690	10 <i>Hw</i>	4 <i>Hw</i>	4081.432	80	40
3928.704	15	7	3996.987	3 <i>c</i>	1 <i>c</i>	4082.65	2	1
3929.198	6	3	4000.122	3 <i>cs</i>	1 <i>cw</i>	4083.365	20 <i>cs</i>	8 <i>cs</i>
3929.847	200	100	4001.19	3	1	4083.584	20 <i>cs</i>	8 <i>cs</i>
3930.48	1 <i>c</i> .23 <i>Wl</i>	5 <i>c</i> <i>W</i>	4004.38	-----	3 <i>h</i>	4084.77	-----	3
3930.53	6 <i>c</i> .19 <i>Wl</i>	3 <i>c</i> <i>W</i>	4004.930	70	30	4085.01	-----	4
3931.201	20	10	4007.22	2	1	4085.14	-----	2
3932.538	2 <i>c</i>	1 <i>c</i>	4007.34	-----	2 <i>h</i>	4085.67	-----	2 <i>h</i>
3932.934	4 <i>cs</i>	2 <i>cs</i>	4008.97	1	-----	4086.31	-----	2 <i>h</i>
3934.28	1	-----	4008.99	-----	2 <i>h</i>	4087.89	4 <i>cw</i>	1
3936.70	2	1	4009.54	-----	3 <i>h</i>	4088.10	4 <i>c</i> .16 <i>Ws</i>	2 <i>c</i> <i>W</i>
3936.899	100 <i>c</i>	50 <i>c</i>	4009.94	-----	10 <i>h</i>	4088.69	1	2 <i>h</i>
3937.628	2 <i>h</i>	1 <i>h</i>	4010.322	3 <i>cw</i>	1 <i>cw</i>	4089.01	5 <i>cvl</i>	3 <i>c</i>
3939.381	-----	5 <i>h</i>	4012.26	15	5	4089.407	4 <i>cs</i>	2 <i>c</i>
3941.468	6	3	4014.855	4 <i>h</i>	2 <i>h</i>	4089.919	30 <i>cw</i>	15 <i>cw</i>
3941.540	8	4	4016.60	-----	1 <i>h</i>	4090.59	2	1
3942.42	2 <i>h</i>	2 <i>h</i>	4016.95	1	1	4091.12	4 <i>cw</i>	2 <i>cw</i>
3942.562	10	5	4018.016	-----	4 <i>h</i>	4091.96	-----	20 <i>h</i>
3943.52	-----	1 <i>h</i>	4018.40	20 <i>c</i>	10 <i>c</i>	4094.60	-----	1 <i>h</i>
3944.344	15	7	4019.124	6 <i>c</i>	3 <i>c</i>	4095.30	-----	2 <i>h</i>
3944.718	50 <i>cw</i>	30 <i>cw</i>	4020.860	-----	10 <i>h</i>	4096.44	3 <i>h</i>	1 <i>h</i>
3945.906	150 <i>c</i>	80 <i>c</i>	4022.86	10 <i>c</i>	4 <i>c</i>	4096.94	-----	4 <i>h</i>
3946.75	2	1	4022.965	60	20	4097.42	-----	1 <i>h</i>
3947.428	-----	10 <i>h</i>	4023.313	40 <i>cs</i>	15 <i>cw</i>	4099.31	2 <i>h</i>	1
3950.570	15	6	4024.040	-----	6 <i>h</i>	4102.16	8 <i>Hw</i>	4 <i>Hw</i>
3950.64	10 <i>cw</i>	4 <i>c</i>	4025.07	3 <i>d</i>	1 <i>d</i>	4103.763	3 <i>h</i>	1
3951.45	2 <i>cw</i>	1 <i>cw</i>	4025.56	-----	2 <i>h</i>	4104.422	70	30
3951.836	2 <i>c</i>	1 <i>c</i>	4025.614	9 <i>c</i>	4 <i>c</i>	4106.440	10 <i>c</i> .23 <i>Wl</i>	4 <i>c</i> <i>W</i>
3952.10	-----	3 <i>h</i>	4026.707	3 <i>c</i>	1 <i>c</i>	4106.829	5 <i>h</i>	2 <i>h</i>
3953.23	3 <i>h</i>	1 <i>h</i>	4027.124	4 <i>c</i>	2 <i>c</i>	4107.431	2 <i>h</i>	1
3954.428	15 <i>c</i>	7 <i>c</i>	4028.53	30 <i>c</i>	15 <i>c</i>	4107.832	1	-----
3956.60	2 <i>c</i>	1 <i>c</i>	4029.63	60 <i>c</i> .23 <i>Wl</i>	30 <i>c</i> <i>W</i>	4107.973	3	1
3957.173	3	1	4031.42	-----	20 <i>c</i> 6, .46 <i>Ws</i>	4108.618	10	4
3957.363	10	4	4032.143	8 <i>c</i>	4 <i>c</i>	4109.451	1	-----
3958.357	7	3	4032.35	-----	5 <i>h</i>	4110.894	100 <i>c</i> .16 <i>Ws</i>	40 <i>c</i> <i>W</i>
3959.39	10 <i>c</i> 6, .35 <i>Wl</i>	4 <i>c</i> <i>Wl</i>	4033.31	100 <i>c</i> .18 <i>Wl</i>	40 <i>c</i> <i>W</i>	4111.672	2	1
3960.552	15 <i>c</i>	7 <i>c</i>	4033.63	10 <i>c</i> .22 <i>Wl</i>	4 <i>c</i> <i>W</i>	4111.598	5	2
3961.036	150	80	4034.74	1 <i>h</i>	-----	4112.275	3 <i>c</i>	1 <i>c</i>
3962.484	30 <i>cw</i>	150 <i>cw</i>	4037.49	50 <i>c</i>	20 <i>c</i>	4113.402	30 <i>cs</i>	10 <i>cw</i>
3963.267	40	20	4038.63	2 <i>c</i>	1 <i>c</i>	4114.676	3	1
3963.53	-----	3 <i>c</i> .22 <i>Wl</i>	4039.52	2 <i>h</i>	-----	4116.30	-----	3 <i>c</i> .34 <i>Wl</i>
3963.707	7	3	4040.178	10	4	4120.23	-----	3 <i>Hw</i>
3964.11	-----	2 <i>Hw</i>	4041.11	-----	1 <i>h</i>	4121.548	10	3



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A'</i>			<i>A</i>		
4121.635	30	10	4230.55	1c	-----	4318.585	10	6
4122.738	8c	3c	4231.53	-----	20c .28Wl	4319.531	15	7
4122.896	2c	1	4232.956	2c	10	4324.33	3c	1c
4123.507	2	1	4233.275	10c	4c	4328.716	3	1
4123.82	2cw	1	4234.43	6c .24W	2cW	4329.076	3	1
4124.803	10c 6, .39Wl	4cWl	4234.95	10c .25W's	3cW	4330.69	-----	9
4128.002	2	1	4235.38	2c	1c	4331.14	2h	-----
4128.136	2	1	4236.237	20	10	4331.365	3	1
4130.458	8	4	4238.016	7c	3c	4332.25	80cws	30cw
4132.277	10	5	4238.586	15	6	4335.23	-----	2h
4133.425	100c 6, .39Wl	40cWl	4239.956	2	1	4335.860	9	5
4135.43	-----	2h	4240.18	-----	4cw	4339.68	8c	2c
4136.45	200c .22W's	100cW's	4241.16	40c	15c	4340.65	-----	5h
4137.603	20	8	4241.35	50	20	4342.145	4	3
4138.532	3	1	4241.42	50	20	4344.65	4c .30W's	1cW
4142.767	4	2	4241.806	2	1	4345.32	1	-----
4144.363	200cw	100cw	4243.85	2	1	4345.505	2	1
4146.233	10c	4c	4244.12	20c .21W's	4cW	4351.72	2h	1h
4146.70	-----	5c .21Wl	4246.820	40hl	10hl	4352.46	4c .26Wl	1cW
4148.276	5h	2h	4247.679	4h	1h	4356.29	-----	6
4149.46	-----	5Hw	4248.27	-----	4h	4357.06	10cwl	6cw
4149.96	50c .17W	20cW	4248.357	2	1	4357.96	10	2
4150.527	10	4	4255.10	2c	1c	4357.98	-----	20
4150.790	2	1	4255.33	2c	1c	4358.69	100cwl	60cwl
4151.076	3c	1c	4255.749	20	7	4359.310	7	4
4152.29	10h	4h	4257.60	200c .24W's	100cW	4360.375	10c	3c
4152.632	30cwl	15cw	4258.68	-----	2h	4361.26	4cwl	1c
4157.252	3c	1c	4259.51	-----	2	4363.37	6cwl	4cw
4159.925	20	10	4259.880	3	1	4364.13	10cwl	9c
4160.773	5cwl	3cw	4260.91	6	3	4364.851	9	3
4161.79	3h	1h	4261.37	6c 6, .29Wl	3cW	4367.58	100c .21Wl	60cW
4162.36	1h	1h	4261.86	3c	1c	4368.67	-----	1h
4164.10	2c	1c	4263.35	3	1	4369.64	2	1
4164.32	1	-----	4263.76	3c	1c	4369.77	4	2
4165.29	-----	1h	4264.26	2h	2h	4372.18	-----	10cwl
4165.31	1h	-----	4264.73	2h	1h	4373.202	5	2
4165.94	-----	4h	4267.97	3c .26W's	2cW	4377.056	2	1
4165.976	5c	2c	4268.71	5cw	3cw	4377.44	3c	1
4166.408	10cwl	4cw	4269.79	3c	1c	4378.48	2c	-----
4168.588	15	5	4269.94	-----	20c .39Wl	4380.45	1	-----
4170.395	100d	50d	4272.95	2	1	4380.89	2c	-----
4172.047	2	1	4274.34	10c .21Wl	6cW	4381.00	-----	10cwl
4173.678	2	1	4279.185	3	1	4384.44	-----	2
4173.978	10c	4c	4280.59	6	3	4385.443	10c	4c
4175.186	10c	4c	4281.664	2c	1c	4386.14	2cw	-----
4176.540	10c .18Wl	4cW	4282.734	10	4	4387.404	10cws	5c
4176.867	6c	3c	4282.99	4	3	4389.60	-----	10cwl
4177.419	2c	1c	4285.55	1h	-----	4391.342	100cws	40cw
4178.599	3	2	4286.084	5	4	4392.122	3	1
4179.73	3cw	2cw	4286.463	10c	5c	4392.45	40c .28W's	20cW
4181.29	2cw	1cw	4288.08	-----	4h	4394.30	80c	30c
4182.902	100	50	4289.09	-----	4h	4394.46	50c	20c
4183.056	100	50	4291.17	100c 6, .29Wl	40cWl	4396.089	10cwl	5cw
4184.48	2h	1h	4291.654	30c	10c	4396.802	30	10
4185.72	2h	1h	4291.80	8	3	4399.80	8cw	5c
4186.26	-----	2h	4294.62	2c	1c	4400.92	-----	2h
4187.909	5	2	4295.97	-----	2h	4402.600	40c	20c
4188.441	2	1	4298.14	4cw	2cw	4403.683	5	3
4189.52	-----	2h	4298.20	3h	2h	4404.27	1	-----
4190.782	2cw	1cw	4299.917	20	20	4406.30	20c	6c
4191.92	3Hl	2Hl	4301.052	4	2	4406.47	30cws	10cw
4194.668	50cwl	20cw	4301.774	4cw	2cw	4406.89	-----	2h
4195.741	10c	4c	4302.11	3d	1	4408.64	3cw	-----
4198.60	-----	2cw	4302.28	2	1	4409.56	-----	3cwl
4203.308	7cw	3cw	4304.404	100cWl	50cWl	4410.39	2h	-----
4204.525	30cws	10cw	4304.78	2	1	4413.500	1	2
4204.95	2h	-----	4305.334	15c	5c	4415.822	80	80
4204.964	2c	1	4308.802	4c	2c	4417.22	8	2
4208.53	-----	2h	4309.474	9c	4c	4417.33	10	3
4210.69	-----	4h	4310.41	2c	1	4418.808	6	5
4212.56	3h	2h	4311.68	-----	20h	4419.86	2h	1h
4213.266	30cwl	10cw	4312.75	-----	3h	4423.02	-----	20
4214.974	2	1	4313.31	2h	-----	4423.810	2	1
4215.500	15	7	4314.578	15	7	4425.762	2	1
4221.079	200c	100c	4315.71	20c 6, .38W's	6cW's	4426.47	2c	5h
4222.500	2c	1h	4316.18	4	2	4427.67	2	-----
4223.178	15cw	7cw	4316.52	-----	4h	4427.951	7cwl	2c
4224.163	15c	5c	4317.11	5cw	5h	4428.864	2h	-----
4227.46	2000c .32Wl	1000cW	4317.68	2h	1h	4429.76	-----	4h
4228.748	3cw	1cw	4317.93	2h	1h	4432.846	1h	-----

TABLE 2. Arc and spark spectra of rhenium—Continued

Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		
Arc	Spark		Arc	Spark		Arc	Spark	
<i>A</i>		<i>A</i>		<i>A</i>				
4433.72	-----	5h	4545.174	100	70	4662.99	Scw	5c
4434.24	2	-----	4545.53	10	5	4664.01	1	8
4434.43	-----	5h	4549.82	-----	3h	4665.217	5	4
4436.614	3	1	4551.502	4	3	4666.713	6	4
4440.44	20cw	10	4556.025	3	2	4668.56	-----	3h
4445.97	2hw	-----	4556.820	1	2	4669.81	-----	-----
4448.115	2	-----	4557.33	4cw	3c	4673.15	2c .31Ws	100c
4448.259	2	1	4557.80	-----	3	4674.304	9	6
4452.68	-----	10	4559.268	50	15	4675.38	2	1
4453.26	2cw	-----	4559.682	50	50	4679.476	15	6
4453.92	20c	5c	4562.325	3	3h	4681.89	20c	1h
4454.62	50c .36Ws	20cWs	4562.92	-----	7h	4682.319	6h	30
4456.370	3	2	4563.63	7cs	6c	4684.02	-----	5h
4456.668	6c	4c	4564.633	4	2	4685.05	1h	-----
4457.47	2	3h	4565.30	50c	30c	4685.20	1h	-----
4458.122	2c	2h	4565.51	60c	40c	4685.853	20	10
4459.405	3	2	4568.748	2h	2h	4688.87	1h	-----
4463.53	20	10	4569.75	-----	5h	4690.90	-----	10h
4464.627	2	1	4572.195	4	3	4691.45	4h	3h
4465.834	5	2	4575.935	2cw	1c	4692.80	1	1h
4467.544	15	7	4577.27	-----	2	4693.38	8	7
4467.924	40	20	4577.550	3	2	4694.99	30c .27Ws	10cW
4468.38	-----	2h	4578.251	4	3	4698.08	2h	-----
4472.06	2	1	4578.93	3h	2	4698.38	1h	-----
4473.23	4	-----	4580.68	100	50	4699.69	4	3
4473.31	-----	20	4583.796	2c	-----	4700.440	50	20
4473.60	-----	2h	4584.49	-----	30c .51Ws	4703.70	-----	10cw
4475.082	80	80	4586.06	3c .18W	2cw	4703.78	4c	-----
4475.73	-----	5h	4587.141	8	4	4703.91	1	-----
4476.78	6cl	5cl	4588.821	2	1	4705.04	60c	40
4477.642	3	2	4590.540	3	1	4708.570	2	1
4477.986	30c	20c	4591.682	20	10	4709.45	2	-----
4478.386	60	40	4592.53	4cl	3cl	4711.22	2	-----
4480.75	-----	3h	4595.263	4	4	4712.14	2	-----
4481.32	-----	100c .50Ws	4595.64	1	-----	4712.76	20	10
4481.443	10	?	4596.56	-----	100h	4714.78	-----	10
4483.16	-----	7l	4597.32	5c .19W	2cW	4719.57	-----	5h
4484.44	-----	5hw	4598.143	6	4	4724.62	-----	4
4486.58	3h	1h	4599.764	1	-----	4725.02	4c .36Wl	3cW
4486.991	5	4	4601.13	1h	-----	4725.93	20	15
4489.99	-----	8c	4605.73	200	100	4727.60	80	60
4493.460	1	5c	4607.80	3cw	-----	4730.43	2h	2
4494.12	3	4	4608.802	4	2	4733.87	4	5
4495.01	2cw	-----	4609.81	1h	-----	4739.24	-----	5h
4496.432	15	10	4613.95	5	?	4739.95	-----	5
4498.378	10	5	4614.66	50c .24W	40cW	4740.80	-----	8
4499.04	3	2	4616.57	30c	20c	4742.19	-----	9h
4502.52	4	3	4621.38	80	70	4742.84	2	-----
4502.98	-----	6	4623.34	5c	4c	4743.46	4	3
4504.41	4	3	4625.96	30c	10c	4745.67	2	2
4505.49	-----	5	4626.50	-----	5h	4746.24	5	5
4507.035	100c	100c	4628.76	1	-----	4748.06	8	8
4508.007	60	50	4630.24	7cwl	?	4748.38	80c .20Ws	60cW
4508.39	1	-----	4630.82	80cw	?	4749.03	40	30
4511.25	-----	3h	4634.41	10c .22W	5cW	4750.21	-----	3h
4513.31	500c .32Ws	500cW	4635.78	3	1	4750.99	5	5
4514.26	20c	10c	4640.63	1h	-----	4751.23	1	-----
4515.142	7	5	4640.94	1h	-----	4751.345	10c	10c
4516.638	200	200	4641.412	1h	-----	4752.10	4	2
4517.774	1	-----	4642.68	2	?	4755.64	-----	10h
4518.570	3	2	4642.78	1	-----	4758.833	40	20
4519.09	-----	5	4644.95	20cwl	10cw	4763.672	20cw	10c
4519.762	80c	80c	4646.27	1h	-----	4765.81	-----	8h
4520.97	-----	20	4647.46	10c	6c	4766.89	2	2
4522.73	400	400	4648.55	4	?	4771.807	4	4
4523.878	100	100	4649.19	1h	-----	4772.04	1h	-----
4526.009	80c	70c	4649.70	3	2	4778.99	4h	?
4526.98	10cw	8c	4650.093	3	2	4781.83	2h	?
4528.966	60	50	4650.825	3h	2h	4789.206	10	2
4529.950	150	150	4651.20	1h	-----	4789.60	3cw	-----
4530.889	30	15	4651.82	4	2	4791.418	200cw	50c
4531.36	1	-----	4652.33	100	70	4796.895	4	1
4536.014	40	30	4652.77	2cw	-----	4799.127	15	2
4537.48	-----	6	4654.53	10c	-----	4799.49	9	2
4537.54	3c	-----	4654.63	-----	20hl	4800.778	4cw	1cw
4539.16	5c .37Ws	?	4656.29	2h	-----	4802.28	1	-----
4539.23	?	10Hw	4656.47	10c	7c	4805.56	2h	-----
4541.80	50	40	4660.51	10	5	4813.139	3	1
4542.89	-----	4cw	4661.483	9	10	4814.92	2c .36Wl	-----
4543.98	1	2	4662.493	60	10	4816.03	2c	1

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
4820.57	20c .26Wl	5cW	5027.943	15	2	5229.087	1	-----
4822.65	2	2	5029.75	2c	-----	5231.31	1	-----
4825.11	2	-----	5031.57	1h	-----	5234.306	20cws	4cw
4829.87	6c .33Wl	1cW	5031.94	2h	-----	5236.660	10cwl	3cw
4833.98	3c .35Wl	-----	5036.88	1h	-----	5243.52	2c	-----
4834.79	9cs	2	5041.40	3Hw	-----	5244.334	10	2
4835.23	1h	-----	5042.631	7c .26Ws	1cW	5247.97	1h	-----
4845.67	3	1	5052.20	2	-----	5248.856	30	5
4846.26	3c	1c	5052.365	1	-----	5250.085	3cw	1c
4848.45	20c .27Wl	5cW	5054.95	1h	-----	5252.34	3	1
4849.23	1	-----	5056.063	10c	2	5255.43	1h	-----
4852.57	7cw	2c	5058.557	100	9	5260.62	3	-----
4853.73	3cw	10c .67Ws	5060.427	5	1	5261.88	1	-----
4856.70	1h	-----	5063.76	5cw	1cw	5262.39	4cw	3cw
4862.539	5	1	5065.31	3	1	5262.92	-----	5c
4868.43	2	-----	5066.60	-----	1h	5264.416	4	2
4870.03	3cw	1c	5067.544	2	1	5265.12	5Hw	2H
4872.032	3c	1c	5068.85	4cws	1c	5270.95	4000c.38Ws	2000cW
4872.43	2	-----	5070.64	-----	3h	5273.25	2h	-----
4874.237	2	1	5078.423	6	1	5275.56	1000c.50Ws	500cW
4874.85	10	2	5081.573	1	-----	5278.245	200	20
4876.929	2	-----	5087.65	2h	-----	5279.102	2	-----
4881.278	3c	1c	5089.87	1h	-----	5280.54	5c.32Wl	-----
4882.45	3	1	5090.57	6	1	5284.581	5	2
4884.10	3	1	5093.19	3c	-----	5286.68	-----	5h
4885.80	2	-----	5094.03	3c	1	5287.92	10c.25Wl	2cW
4889.14	2000c 6, .548Wl	500cWl	5095.78	10cws	4cw	5289.16	1c	-----
4892.222	4cw	1c	5096.50	150	10	5292.278	4	1
4896.167	10	3	5098.782	2	-----	5299.85	1c	-----
4897.529	4c	2c	5099.20	-----	5c	5300.75	5c	1c
4899.634	6	2	5100.70	2	-----	5303.21	1	-----
4901.445	3	2	5104.66	20c .29Wl	5cW	5305.56	30c	10hI
4903.73	15cw	2cw	5105.15	10	3	5306.739	3	1
4904.33	-----	10cw	5108.78	10	2	5309.87	2c	-----
4904.75	2	-----	5112.265	15	3	5311.515	6cw	2cw
4905.93	1	-----	5113.25	1	-----	5317.275	30cwl	6cw
4906.208	30	4	5115.18	1	-----	5318.76	1h	-----
4908.562	20	3	5116.90	2	-----	5319.23	2h	-----
4909.066	4cw	1c	5117.42	2c	-----	5321.278	40c	6c
4909.71	-----	4cw	5120.32	30c	4c	5321.534	2	1
4914.34	4c	-----	5124.206	2h	-----	5324.50	2	-----
4915.020	100	10	5124.597	9c	2	5325.00	4c.53Ws	-----
4917.84	6	2	5126.70	20c 6, .52Wl	4cWl	5327.46	200	10
4923.903	200	40	5140.058	4	1	5331.896	50cwl	5cw
4925.99	2h	-----	5141.288	3	-----	5332.47	2h	-----
4926.893	4	2	5142.14	1h	-----	5332.76	9c	7hI
4928.585	3cw	1cw	5145.593	6	2	5333.85	20	5
4932.350	2	-----	5146.89	15c .28Ws	5cW	5338.63	3c	-----
4933.734	30cw	5cw	5156.248	15c	2c	5339.416	3	-----
4935.842	15	4	5161.650	30	6	5342.37	4Hw	-----
4940.53	2h	-----	5165.198	5	1	5343.70	3Hw	-----
4943.73	8cl	2c	5167.860	2c	-----	5345.221	2	-----
4944.987	7c	2c	5172.370	2	1	5349.245	3	-----
4946.72	150	20	5173.92	1h	-----	5350.45	4c.39Wl	1cw
4949.82	20	3	5178.891	80cw	10cw	5352.64	1h	-----
4952.270	2	-----	5181.741	20	3	5353.35	2h	-----
4955.286	3c	1	5185.896	3	-----	5353.73	1	-----
4956.765	100	10	5186.149	2	-----	5356.65	1h	-----
4960.42	2h	-----	5186.423	1	-----	5366.664	2	1
4961.383	10c	3	5196.11	-----	2h	5369.480	30	7
4963.065	10cw	2cw	5198.915	3c.44Wl	-----	5369.797	30	5
4969.435	10	3	5199.89	8cwl	2c	5374.720	4	1
4972.836	8	2	5200.82	4cw	1c	5377.10	200c.32Ws	30cW
4976.932	2c	1c	5202.03	2	-----	5378.163	5c	1c
4980.677	7c	2c	5202.83	1c	-----	5379.707	3	1
4981.544	20	3	5203.46	2	-----	5390.18	1h	-----
4984.812	5	3	5206.74	1h	-----	5396.50	9	3
4985.978	200c	20c	5209.08	200cws	20cw	5402.19	2h	2h
4987.521	5	2	5209.927	10	2	5409.52	1	-----
4994.02	3cw	-----	5210.93	1	-----	5410.01	2cw	-----
4994.48	1	-----	5214.43	5Hw	-----	5417.78	5Hw	-----
4996.22	1	-----	5214.716	5	1	5418.37	-----	5h
4997.74	4c	1	5217.49	2c	-----	5423.29	2	1
5003.60	10	2	5218.18	5h	-----	5423.60	4	1
5006.68	1	-----	5221.124	5cw	2cw	5423.81	6	2
5008.14	6c.30Ws	?	5222.124	5	1	5431.90	30c	10hI
5010.56	4c	1	5222.733	1	-----	5437.03	10	2
5014.35	1	-----	5223.022	1	-----	5437.41	3	1
5024.022	2	-----	5224.786	10cws	2cw	5443.31	2h	-----
5026.452	20	3	5226.805	2h	-----	5444.50	1h	-----

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
5447.92	15	3	5734.79	2	-----	6146.82	80c	10
5456.316	4cs	1c	5736.27	2	-----	6169.51	6	2
5458.92	2h	-----	5737.32	2c	-----	6169.70	3	-----
5460.644	30c	4	5738.17	3Hw	-----	6176.57	10cwl	3cw
5465.43	7	4h	5739.445	7	1	6181.71	3	1
5467.54	3	1	5740.32	10c 6, .64Wl	2cWl	6187.92	4c	1
5470.910	3c	1c	5749.86	2h	-----	6191.17	2	-----
5475.86	1h	-----	5752.93	200cw	20cw	6195.44	15cwl	3c
5481.003	5	1	5763.41	3cw	-----	6200.734	3	1
5492.19	3cl	-----	5769.82	2h	-----	6203.24	20c	4c
5494.34	2c	-----	5773.32	1h	-----	6217.97	50c	6
5495.69	2cw	-----	5776.83	300c .47Wl	20cW	6218.74	6cl	1
5499.79	1h	-----	5778.16	1	-----	6229.42	60c .50Ws	10cWs
5501.921	5	1	5778.343	3	-----	6243.24	80c .60Ws	15cW
5505.60	3cw	-----	5782.58	7	2	6247.44	2	-----
5505.81	1	-----	5783.01	2	-----	6247.70	3	1
5506.492	2	-----	5786.10	5	1	6252.08	2	-----
5514.90	2cw	-----	5786.27	7	1	6253.03	5	1
5519.53	4cw	1c	5791.595	20	4	6254.96	1	-----
5520.05	10c	5c	5796.262	2	-----	6255.21	1	-----
5521.10	15	4	5805.77	2cw	-----	6260.025	20	2
5521.83	2h	-----	5806.97	10	2	6260.238	40	4
5523.40	8c .35Ws	3cW	5807.41	4cw	1cw	6265.07	4cs	1h
5524.25	2h	-----	5808.86	8cw	2cw	6271.37	30c .39Ws	4cW
5529.96	2h	-----	5810.82	4c .40Wl	-----	6272.14	3cw	-----
5532.676	50cw	10cw	5815.92	20c .25Wl	2cW	6278.76	30	4
5534.35	1h	-----	5818.07	2	-----	6286.41	15cwl	2c
5535.94	2h	-----	5818.28	2	-----	6290.11	6c	1c
5545.15	2h	-----	5827.37	1h	-----	6298.35	2c	-----
5557.21	7	2	5834.31	1000	200	6303.42	10	2
5563.24	100cws	10cw	5835.52	5c .50Ws	-----	6305.97	1h	-----
5564.12	7	2	5844.96	2c	-----	6306.19	2h	-----
5570.40	1h	-----	5852.02	20c .52Wl	4cWl	6307.70	400	60
5573.47	30cw	5cw	5852.76	3	1	6307.91	200	30
5577.69	8cws	1cs	5866.58	3	-----	6321.90	800	100
5578.38	3c .62Wl	-----	5868.05	8	1	6332.24	2h	-----
5580.77	2	-----	5870.71	2	-----	6340.65	2cw	-----
5582.89	2	-----	5872.557	1	-----	6350.64	300	20
5584.718	30c	5c	5885.65	1h	-----	6350.87	200	10
5592.68	2c	1	5899.25	8c 6, .55Wl	1cWl	6362.69	2	-----
5594.856	6c	1	5903.99	7c	-----	6362.94	3	-----
5601.92	3	-----	5908.01	3Hw	-----	6373.47	10cs	2c
5604.15	2h	-----	5909.99	5c	1	6374.81	1Cc .48Wl	2cW
5607.21	8c	2	5911.14	5cl	1	6378.60	2	-----
5607.41	3c	-----	5916.66	4cwl	-----	6382.94	15c	3c
5608.803	3h	2h	5919.86	9cs	2c	6401.22	2cw	-----
5610.516	3	1	5925.08	2h	-----	6402.74	2h	-----
5612.269	10cws	5hs	5927.38	6cws	1c	6405.98	20c .46Ws	2cW
5614.85	2c	-----	5938.83	2h	-----	6409.14	2cw	-----
5619.76	4	1	5943.24	100c	10c	6411.47	20	2
5621.22	1	-----	5945.46	2c	-----	6416.13	2h	-----
5624.625	3h	2h	5947.57	2h	-----	6420.44	2h	-----
5625.441	8cw	3cw	5950.21	10cw	3c	6422.24	2h	-----
5635.45	3	2	5954.308	4c	1	6427.88	2c	-----
5644.467	3	1	5956.10	4cs	1c	6436.69	3	-----
5653.018	8	2	5967.626	5	-----	6449.28	8cs	-----
5658.68	4	1	5969.77	20cwl	5c	6462.55	2	-----
5662.83	5c .33Ws	1cW	5972.58	4c	1	6501.17	5	-----
5664.69	3	1	5981.65	6c	2c	6502.22	7	-----
5665.01	3cw	1	5982.67	8	2	6510.78	3c	-----
5667.88	100	20	5983.14	7	2	6511.47	80c	-----
5671.04	3c	?	5989.99	8cs	2	6515.25	20	-----
5672.68	3cw	?	5995.73	20cw	5c	6529.21	7	-----
5678.34	3c .41Ws	-----	6021.83	2h	-----	6531.11	2h	-----
5680.92	4c	1	6026.53	3	-----	6544.91	10	-----
5683.40	2h	-----	6026.60	-----	5h	6545.72	8	-----
5684.31	2	1	6028.87	2h	-----	6554.66	4	-----
5686.81	2cw	-----	6029.16	2	-----	6557.67	10cws	-----
5689.75	6c .20W	1cW	6030.67	3cw	-----	6577.11	70cws	-----
5692.46	2cw	-----	6036.32	3c	-----	6586.21	2	-----
5706.48	6h	3h	6039.67	10cwl	2cw	6592.52	100c .48Ws	-----
5711.426	30	3	6051.19	5	1	6605.05	150c	-----
5714.02	5	1	6067.39	2Hw	-----	6605.33	100c	-----
5716.950	15	2	6068.42	2h	-----	6612.53	4	-----
5725.626	9	2	6081.57	2h	-----	6623.91	100c	-----
5727.90	3	1	6097.20	2h	-----	6637.25	30c .40Wl	-----
5730.96	1	-----	6114.22	60	6	6649.02	4Hw	-----
5732.25	2cw	-----	6125.47	10	2	6652.39	200c .53Wl	-----
5733.06	5cwl	1c	6132.98	6cw	2c	6658.74	5	-----
5734.26	5cws	1c	6145.81	100cwl	15cw	6665.32	20c 6, .74Wl	-----



TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
6675.28	8cvs		7494.02	2		8630.60	7Hw	
6683.28	20cvs		7524.48	10Hw		8643.59	20cw	
6688.75	7cw		7526.49	3c		8648.98	20c 6, 1.25Wl	
6707.76	5cw		7536.40	2		8675.65	40c 6, 1.11Wl	
6711.36	10cs		7545.39	5c .64Wl		8680.33	3	
6717.23	2		7548.72	30		8683.74	10	
6723.19	2		7567.80	6		8686.94	1	
6723.55	3h		7578.73	300c .40W		8697.25	20c .49Wl	
6724.98	6c		7583.26	10c 6, .70Wl		8721.34	4Hw	
6751.22	100		7596.30	2		8721.88	4Hw	
6761.19	10cw		7611.89	100		8750.44	3h	
6791.30	1		7620.25	200c 6, .81Wl		8772.49	2h	
6791.43	1		7640.94	400c .70Wl		8786.77	40c .54W	
6799.59	6c .44Wl		7652.3	5Bl		8792.0	2h	
6801.66	5		7656.80	7		8797.70	30c .62Wl	
6805.35	5cw		7683.45	2		8844.57	2cs	
6811.37	4		7684.83	3		8845.23	3cw	
6813.41	300cwl		7693.41	6		8851.32	3c .93Wl	
6816.41	2		7693.70	10c		8871.82	1	
6829.90	300cvs		7705.92	30c .40W		8882.95	15cvs	
6835.35	3Hw		7712.58	2c		8886.58	15c	
6844.06	5		7733.61	30		8899.2	2c	
6844.44	5		7743.08	5		8901.36	3cw	
6874.35	8cw		7743.29	4c		8927.28	5	
6882.11	3c		7789.75	7		8944.56	2	
6929.62	2cl		7789.96	10		8962.07	2	
6963.50	3cw		7794.67	5		8966.63	7cw	
6967.67	8cvs		7799.58	3		8969.21	4	
6971.53	200cw		7801.05	4c		8971.14	2	
6971.98	7cw		7825.85	20		8983.55	1	
6976.67	2		7828.13	10		8988.40	2	
6985.20	20c 6, .63Wl		7844.14	10c .40Wl		8992.91	1	
7006.63	150c .46Wl		7861.82	7		8995.26	1	
7012.56	5c .53Wl		7869.62	100c 6, .93Wl		9003.24	1	
7024.15	200c .37Wd		7880.56	2		9009.15	2cw	
7028.47	7c .33Ws		7880.78	3		9018.9	1	
7058.24	10c		7882.11	20c 6, .60Wl		9032.46	3	
7059.98	6c		7888.90	9		9044.38	6	
7065.39	3		7898.46	40		9058.53	3	
7066.47	10		7912.94	400c .60W		9059.85	4	
7093.01	2cw		7938.57	9		9063.31	2	
7119.01	5Bl		7970.87	20		9066.6	2c, 1.0W	
7128.98	4		7971.24	30		9070.74	5	
7129.45	7c 6, .70Wl		7979.03	10		9081.45	4	
7135.28	10		7980.77	300c 6, .73Wl		9083.03	2	
7172.20	10		7985.26	3		9102.47	1	
7188.04	2		8004.63	4		9123.76	1c	
7198.25	4		8024.07	2		9132.08	2cw	
7228.03	20		8027.50	4		9144.86	6cw	
7233.90	3cw		8052.47	2		9154.52	1	
7237.26	4l		8055.96	5c		9165.38	2	
7246.49	150		8060.10	30c		9171.35	1cw	
7246.80	100		8088.27	15		9192.18	1	
7263.86	4		8166.63	6c .57Wl		9198.04	1	
7265.43	5		8224.31	3cw		9205.12	2cw	
7273.84	150c .65Wl		8246.93	4		9209.66	2cw	
7292.72	300c .57Wl		8253.24	2		9213.58	2	
7307.55	5c		8253.57	2		9220.40	1	
7315.91	3		8262.72	5c		9236.50	4	
7324.20	7		8262.98	5c		9250.02	10	
7329.37	6		8273.56	3h		9253.71	1	
7352.04	50c 6, .70Wl		8293.73	20		9255.71	2cw	
7360.95	4hl		8301.01	20c .38Ws		9262.28	4	
7382.67	3cw		8335.44	3		9268.46	15cw	
7384.07	1		8354.00	2		9278.3	1cw	
7386.35	20c		8357.58	40cvs		9298.07	1	
7390.71	4c .64Ws		8399.78	10c .42Wl		9307.72	1	
7396.04	2c		8403.58	3		9311.59	5	
7404.28	3h		8411.59	3h		9325.90	3	
7409.46	20		8417.13	500		9328.36	1	
7416.44	3c		8433.70	3		9332.47	2cw	
7431.93	2		8503.35	3c		9337.73	2cw	
7437.79	2		8507.73	6cvs		9363.13	20c	
7440.69	4		8527.73	500c .67W		9367.59	1	
7442.75	1		8537.38	2		9370.87	2	
7447.58	4		8570.69	15		9377.02	1	
7478.63	5		8588.50	5cw		9380.24	10c	
7481.15	7c		8593.60	5		9383.75	40	
7488.12	3c		8603.86	6		9391.12	2	
7489.10	2		8628.44	5Hl		9400.27	2Bl	

TABLE 2. Arc and spark spectra of rhenium—Continued

Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics		Wavelength	Intensity and other characteristics	
	Arc	Spark		Arc	Spark		Arc	Spark
<i>A</i>			<i>A</i>			<i>A</i>		
9423.45	15		9955.45	60c, 1.2 <i>Wl</i>		10593.74	2 <i>cw</i>	
9427.53	3		9964.90	2		10599.31	8 <i>cw</i>	
9468.38	1		9970.87	1c		10610.0	2c	
9470.15	30		9976.45	4		10618.45	40c	
9481.6	1 <i>cw</i>		9980.9	1c		10625.57	8	
9500.49	8		10006.4	1c		10639.45	100 <i>cw</i>	
9504.34	3		10010.29	1 <i>cw</i>		10654.56	2c	
9523.40	6 <i>cw</i>		10019.21	7 <i>cw</i>		10725.62	1	
9564.66	1		10026.96	5c		10801.55	2c	
9571.75	6 <i>cw</i>		10056.81	1		10804.3	1c	
9581.12	8c		10059.56	2 <i>cw</i>		10824.22	10	
9587.0	2 <i>Bl</i>		10064.02	10c, 2.20 <i>Wl</i>		10862.25	10 <i>cw</i>	
9591.32	3 <i>cw</i>		10127.21	1		10909.5	1	
9600.98	1		10128.78	15		10919.30	1	
9617.78	2 <i>Bl</i>		10138.24	2		10933.44	2c	
9635.30	5c		10146.84	1		10942.23	3 <i>cw</i>	
9685.69	1		10162.75	1		10949.4	2c	
9704.94	3		10169.85	100c, 1.08 <i>Wl</i>		10962.5	1	
9710.52	50		10175.68	20 <i>cw</i>		10967.6	1	
9722.76	4		10183.32	4c		11004.02	1	
9725.6	1 <i>cw</i>		10191.57	1c		11042.96	2 <i>cw</i>	
9748.60	3		10197.58	1c		11054.29	30	
9749.66	6		10201.86	2 <i>cw</i>		11065.02	2 <i>cw</i>	
9752.08	4		10206.32	20		11141.90	1	
9762.65	20		10238.26	4		11278.5	20c, 2.2 <i>Wl</i>	
9790.20	1		10242.68	1		11309.97	4c	
9813.75	2		10258.42	1		11383.70	8 <i>cul</i>	
9831.35	9		10262.77	2		11453.12	3c	
9842.65	20c, 1.32 <i>Wl</i>		10282.46	5 <i>cw</i>		11474.23	4	
9851.88	1		10287.58	4 <i>cw</i>		11499.93	5	
9872.38	15 <i>sd</i>		10329.72	1		11581.4	1c	
9884.10	2 <i>cw</i>		10332.55	10 <i>cw</i>		11615.8	1c	
9901.72	1		10341.3	1		11788.9	1	
9903.30	5c		10349.0	4c				
9908.97	4c		10440.92	3				
9921.7	1 <i>cw</i>		10464.25	10				
9937.8	1		10492.3	1				
9943.70	20		10556.54	20c				
9949.90	200c, 1.8 <i>Wl</i>		10579.7	1				
9953.02	3 <i>cw</i>		10589.7	1				

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